SAMPLING FOR PESTICIDE RESIDUES IN CALIFORNIA WELL WATER

2005 Update of the Well Inventory Database

For Sampling Results Reported From July 1, 2004 through June 30, 2005

Twentieth Annual Report

Pursuant to the
Pesticide Contamination Prevention Act

California Environmental Protection Agency
DEPARTMENT OF PESTICIDE REGULATION

December 2005

EH05-06

California Department of Pesticide Regulation

Arnold Schwarzenegger, Governor

Alan Lloyd, Ph.D., Secretary
California Environmental Protection Agency

Mary-Ann Warmerdam, Director
Department of Pesticide Regulation

SAMPLING FOR PESTICIDE RESIDUES IN CALIFORNIA WELL WATER

2005 Update of the Well Inventory Database

For Sampling Results Reported From July 1, 2004 to June 30, 2005

Twentieth Annual Report

Pursuant to the
Pesticide Contamination Prevention Act

DPR portion:
J. Schuette, J. Troiano, M. Pepple
SWRCB Portion: Staff

California Environmental Protection Agency
California Department of Pesticide Regulation
Environmental Monitoring Branch
Environmental Hazards Assessment Program
1001 I Street, Sacramento, California 95814

EH05-06

EXECUTIVE SUMMARY

The Pesticide Contamination Prevention Act

The Pesticide Contamination Prevention Act (PCPA), enacted in 1985 and subsequently amended, provides mechanisms that strengthen the Department of Pesticide Regulation's (DPR's) regulatory authority to prevent ground water contamination and to respond to detections of pesticide residues in ground water. The PCPA requires:

1. DPR to maintain a statewide database of wells sampled for pesticide active ingredients (AIs).
2. State and local agencies to submit results of well sampling for AIs to DPR.
3. DPR to post on its website specified data contained in the database and actions taken to prevent pesticide contamination.

The Well Inventory Database

This is the twentieth annual report, which summarizes data collected from July 1, 2004, to June 30, 2005. Data in these reports are used to:

1. Display geographic distribution of well sampling.
2. Display geographic distribution of pesticides in sampled wells.
3. Identify areas potentially vulnerable to contamination by the legal, agricultural use of pesticides
4. Design studies for future sampling.

The data do not represent a complete survey of ground water quality throughout the State, nor do they represent sampling for all pesticides. The data indicate pesticides that are present in well water among those pesticides for which analyses were performed.

Data Summary

1. Data in this report are the result of seven well sampling surveys
2. Data represent 3,966 wells in 52 counties that were sampled for 152 pesticide active ingredients and breakdown products (collectively referred to hereinafter as "pesticide-related compounds"). Ninety-nine percent of the wells sampled were municipal or domestic drinking water wells.
3. Twenty-four pesticide-related compounds were reported with detections. Fourteen detections were verified detections.

Tables 1a and 1b provide an annual and cumulative summary of the number of wells and the number of pesticide-related compounds sampled throughout California for data submitted to DPR by June 30, 2005.

Table 1a. Annual and cumulative summary of the number of wells sampled and their detection status, and the number of counties sampled and their detection status.

Category	Year 2004	Total[(b)] 1985-2005
Total **wells** sampled	3,966	22,297
Wells with no detections	3,528	17,351
Wells with detections [(a)]	438	4,946
Wells with verified detections	79	1,012
Total **counties** sampled	52	58
Counties with no detections	27	8
Counties with detections [(a)]	25	50
Counties with verified detections	3	33

(a) Includes both verified and unverified detections. Detections of pesticide residues are verified if either the analytical method provides unequivocal identification of a chemical as approved by DPR or the residues were detected within 30 days using a second analytical method or a second analytical laboratory approved by DPR.

(b) The total represents unique wells sampled in a county where a single well with sampling data reported in more than one year is counted only once.

Table 1b. Annual and cumulative summary of the number of pesticide-related compounds analyzed, the number of compounds with detections and the number of compounds where DPR determined that detections were the result of non-point source pesticide applications.

Category	Year 2005	Total[(b)] 1985-2005
Total **pesticide-related** compounds analyzed	152	336
Compounds with no detections	128	227
Compounds with detections [(a)]	24	109
Compounds with verified detections	14	30
Compounds with detections in ground water as a result of non-point source pesticide applications	14 [(c)]	19 [(d)]

(a) Includes both verified and unverified detections. Detections of pesticide residues are verified if either the analytical method provides unequivocal identification of a chemical as approved by DPR or the residues were detected within 30 days using a second analytical method or a second analytical laboratory approved by DPR.

(b) The total represents unique compounds analyzed where a single compound that had sampling data reported in more than one year is counted only once.

(c) The fourteen compounds are atrazine, bromacil, diuron, prometon, simazine, hexazinone, norflurazon, deethyl-atrazine, ACET, DACT, alachlor ethanesulfonic acid, metolachlor oxanilic acid, metolachlor ethanesulfonic acid, demethylnorflurazon.

(d) The 19 compounds are 1,2-D, ACET, aldicarb sulfone, aldicarb sulfoxide, atrazine, bentazon, bromacil, DBCP, DEA, DACT, diuron, EDB, norflurazon, demethylnorflurazon, prometon, simazine, metolachlor oxanilic acid metolachlor ethanesulfonic acid, alachlor oxanilic acid, alachlor ethanesulfonic acid and 2,3,5,6-trachloroterephthalic acid (TPA). See Appendix C for more information on individual compounds.

Verified Detections

Detections were verified in 79 wells in three counties. Table 2 summarizes, by county and pesticide, the number of wells with verified detections. In 2004, DPR requested the addition of the norflurazon breakdown product, demethylnorflurazon (DMN), to the triazine pesticide screen. DPR's laboratory developed the method and during a study conducted by DPR to look for metolachlor in Stanislaus County, DMN was detected in ground water for the first time in this county.

Table 2. Summary of wells with verified detections of pesticide residues, by county and chemical. Results are for data reported from July 1, 2004, to June 30, 2005.

County	alachlor ESA	atrazine	DEA	bromacil	diuron	hexazinone	metolachlor ESA	metolachlor OXA	norflurazon	demethylnorflurazon	prometon	simazine	ACET	DACT	**Total Wells**
Fresno		2	6	17	32	1			14	21	1	48	49	46	50
Stanislaus	1			1		1	5	1		2[(a)]			2	5	6
Tulare		1	4	14	17		1		8	9		20	22	20	23
Total Detections	1	3	10	32	49	2	6	1	22	32	1	68	73	71	79

(a) First time verified detection of this chemical in this county

Pesticide Movement to Ground Water

DPR scientists have developed the California vulnerability model (CALVUL) to predict where pesticide contamination of ground water due to agricultural use is likely to occur. CALVUL is based on the soil types associated with sections of land where pesticides have been found in ground water. Using these soil types and depth to ground water of 70 feet or less, DPR identified one-square mile sections of land, called ground water protection areas (GWPAs), that are vulnerable to pesticide contamination. Sections of land where pesticides have already been found in ground water were also identified as GWPAs. GWPAs are classified as either runoff or leaching based on the pathway by which pesticides migrate to ground water in either hardpan or coarse soils, respectively. DPR has also developed runoff management practices and leaching management practices that can be used to minimize the movement of pesticide to ground water in runoff and leaching GWPAs. The GWPAs and management practices were adopted in regulations that became effective May 27, 2004. These regulations are designed to stop movement of pesticides in areas already contaminated, and prevent contamination in other areas before it occurs.

Ground Water Protection List

The Ground Water Protection List (GWPL) is a list of pesticide active ingredients (AIs) having the potential to pollute ground water. It was established according to Food and Agriculture Code (FAC) section 13145(d) and placed in section 6800 of Title 3 of the California Code of Regulations (3CCR). The GWPL is divided into sub-lists (a) and (b). Section 6800(a) is comprised of chemicals detected in soil or ground water as a result of legal, agricultural use. Section 6800(b) includes chemicals that exceed certain specific numerical values and (1) are intended to be applied to or injected into the soil by ground-based application equipment or by chemigation; or (2) where the pesticide labels recommend or require their application to be followed, within 72 hours, by flood or furrow irrigation. To determine whether the pesticides listed in 6800(b) have migrated to ground water, DPR is required to monitor ground water for them.

In fiscal year 2004/2005, the EM Branch of DPR did not conduct a GWPL monitoring survey because it had insufficient resources to fully fund development of an analytical method for the target compound.

Chemigation Initiative

Chemigation is the application of pesticides through irrigation systems. As part of the U.S. EPA's Label Improvement Program, the labels of pesticides that are chemigated must include specific instructions for use of backflow prevention devices to protect a water source injected with pesticides. Since 2001, the Center for Irrigation Technology, California State University Fresno (CIT) and DPR have provided chemigation training sessions throughout California to growers, irrigation dealers, pest control applicators, CAC and DPR Enforcement staff.

DPR also worked with CIT to form a task force to evaluate the need for further educational and regulatory action on chemigation applications. The task force is composed of irrigation specialists, representatives from the agricultural community, engineers with expertise in backflow prevention, representatives from the CAC, and other interested parties. The task force has met twice this year to discuss a variety of topics including alternative chemigation devices, consideration for a certification program, and best management practices for the timing and application of pesticides by chemigation. The task force will continue to meet to finalize recommendations for changes in DPR regulations and to discuss good management practices for chemigation.

Activities of the State and Regional Water Boards

SWRCB and its nine regional water quality control boards are responsible for protecting the beneficial uses of water in California and for controlling all discharges of waste into waters of the state. Section IV of this report summarizes actions taken by SWRCB to prevent pesticides from migrating to ground water, which is available at: http://www.cdpr.ca.gov/docs/empm/pubs/ehapreps/swrcb/ab2021_fy0405.pdf.

PREFACE

This report fulfills the requirements of AB 2701 (Chapter 644, Statutes of 2004), which amended the PCPA to require DPR to post specified information on sampling for pesticide residues in California ground water to its website no later than December 1 of each year. This law replaced the previous requirement that DPR submit the sampling information in a written report to the Legislature, the State Water Resources Control Board (SWRCB) and the Department of Health Services (DHS).

This report presents data reported to DPR from July 1, 2004, to June 30, 2005. This is the twentieth annual report.

The PCPA requires that the annual report give the location of wells for which sampling results were reported. Privacy and security concerns and the large number of wells sampled prevent DPR from listing exact well locations. Instead, locations are summarized by county.

The information in this report is presented in four parts: Sections I, II and III were written by DPR staff. Section IV was written by SWRCB staff and is available at: http://www.cdpr.ca.gov/docs/empm/pubs/ehapreps/swrcb/ab2021_fy0405.pdf.

ACKNOWLEDGMENTS

The authors wish to thank the reviewers whose unique perspectives and experiences helped ensure the accuracy and readability of this report. We gratefully acknowledge the staff of DPR and cooperating federal, state, local, and private agencies for contributing to the database.

DISCLAIMER

The mention of commercial products, their source, or their use in this report is not to be construed as either an actual or implied endorsement of such product.

TABLE OF ACRONYMS AND ABBREVIATIONS

1,2-D	1,2-dichloropropane (propylene dichloride)
3CCR	Title 3 or the California Code of Regulations
ACET	Deethyl-simazine or Deisopropyl-atrazine
AI(s)	active ingredient (s)
CAC	County Agricultural Commissioner
CALVUL	California Vulnerability Model
DHS	California Department of Health Services
CIT	Center for Irrigation Technology
DACT	Diaminochlorotriazine
DBCP	1,2-dibromo-3-chloropropane
DEA	Deethyl-atrazine
DPR	Department of Pesticide Regulation
EDB	Ethylene Dibromide
EM	Environmental Monitoring Branch
ESA	Ethanesulfonic Acid
ETo	evapotranspiration
FAC	Food and Agriculture Code
GIS	geographical information systems
GWPA	ground water protection areas
GWPL	Ground Water Protection List
IRIS	integrated risk information system as a drinking water level
MCL	maximum contamination limit
MDL	minimum detection limit
OEHHA	Office of Environmental Health Hazard Assessment
OXA	Oxanilic Acid
PCPA	Pesticide Contamination Prevention Act
PDRP	Pesticide Detection Response Process
PMZ	Pesticide Management Zone
ppb	parts per billion
PREC	Pesticide Registration and Evaluation Committee
PUR	Pesticide Use Report
RWQCB	Regional Water Quality Control Board
SNARL	suggested no-adverse-response levels
SNV	specific numerical values
SWRCB	State Water Resources Control Board
TPA	2,3,5,6-tetrachloroterephthalic acid
USGS	United States Geological Survey

TABLE OF CONTENTS

LIST OF TABLES

I. WELL INVENTORY DATABASE

Introduction

In 1983, the Environmental Hazards Assessment Program of the California Department of Food and Agriculture, now the Environmental Monitoring Branch (EM) of the Department of Pesticide Regulation (DPR), initiated a project to collect and store data in a database called the well inventory database. The purpose was to (1) compile reliable information on the occurrence of non-point source contamination of ground water and (2) to facilitate graphical and numerical analysis of the data.

Enacted in 1985, the Pesticide Contamination Prevention Act (PCPA) required DPR to take specific actions to prevent further pesticide pollution of the ground water aquifers of the State. One action was to develop and maintain a database of wells sampled for pesticides throughout the State. State and local agencies were required to submit ground water pesticide sampling data to DPR from both point and non-point sources for inclusion in the well inventory database. Additionally, the PCPA mandated DPR to determine if ground water detections of pesticides were due to legal agricultural use, formally review the agricultural use detections to determine if continued use could be allowed, and if so, adopt regulations to modify use of the pesticide. Also, an amendment (Chapter 644, Statutes of 2004, AB 2701) to the PCPA requires DPR to post on its website a summary report of pesticide data collected and actions taken by the Director of DPR and the SWRCB to prevent pesticides from migrating to ground water [Food and Agricultural Code (FAC) section 13152(e)]. This posting requirement replaces the written report that was required to be submitted to the Legislature, SWRCB, and DHS.

This is the twentieth annual report, which summarizes data collected from July 1, 2004, to June 30, 2005. Two of these annual reports, one in 1992 and the other in 2003, are cumulative reports, summarizing the entire contents of the database. The data in the well inventory database that has been summarized in these reports are used to:

- Display geographic distribution of well sampling
- Display geographic distribution of pesticides in sampled wells
- Identify areas potentially vulnerable to contamination by the legal, agricultural use of pesticides
- Design studies for future sampling

The first section of the report describes specific criteria that DPR uses before entering data into the database and the limitations of how the data can be interpreted, and provides a summary of the well inventory data collected from July 1, 2004, to June 30, 2005. The summary tables are organized to highlight verified detections, which are the only detections that serve a regulatory purpose (memo from Weaver D. to Goh K., January 1995). The second section provides a summary of the factors involved in the movement of pesticides to ground water and describes

specific management practices that help prevent ground water contamination. The third section summarizes the actions DPR has taken to prevent movement of pesticides to ground water. The fourth section is a summary of the SWRCB's and the Regional Water Quality Control Board's (RWQCB) monitoring activities and is available at: http://www.cdpr.ca.gov/docs/empm/pubs/ehapreps/swrcb/ab2021_fy0405.pdf.

Criteria for Evaluating Data

Minimum Data Requirements

Effective December 1, 1986, DPR, SWRCB and DHS jointly agreed on the following minimum requirements to be included as part of any pesticide data submitted to DPR:

- State well number (township/range/section/tract/sequence number/base/meridian)
- County
- Date of sample (month/day/year)
- Chemical analyzed
- Individual sample concentration, in parts per billion
- Sampling agency
- Analyzing laboratory
- Street address of well location
- Well type
- Sample type (e.g., initial or confirmation)

Interpretation Limitations

Interpretation of sampling results in the database is subject to the following limitations:

1. The data indicate specific pesticides and Breakdown products detected in well water among those pesticides for which analyses were conducted. They do not represent a complete survey of groundwater quality throughout the state nor do they represent sampling for all pesticides used.

2. Sampling by agencies other than DPR is not necessarily related to suspected agricultural non-point sources of contamination. It should not be assumed that results submitted by those agencies are an indication of which pesticides are more or less likely to reach groundwater as a result of non-point source agricultural use.

Classifying Analytical Results

Each record in the database represents a single well water sample analyzed for pesticide residue. The analytical result is classified according to the following criteria:

(1) A pesticide analysis of a well water sample is designated as a non-detection with the number zero in the concentration field, if the pesticide residue is not detected at or above the minimum detection limit (MDL) of the analytical method.

(2) Samples in which pesticide residues are detected at or above the MDL are classified into one of three categories:

a. ***Unconfirmed:*** pesticide residues detected in only one sample during a single monitoring survey.

b. ***Confirmed, unverified:*** pesticide residues detected in two discrete samples taken from a single well during a single monitoring survey.

c. ***Verified:*** confirmed and unconfirmed detections are verified if they meet the criteria specified in (FAC section 13149[d]), which requires that either the analytical method provides unequivocal identification of a chemical as approved by DPR or that the detection is verified within 30 days by a second analytical method or a second analytical laboratory approved by DPR. Criteria have been set by DPR (Biermann, 1989, 1996) for determining if the detection of a pesticide or its breakdown product(s) meets the standards of section 13149[d]. A confirmed or unconfirmed detection may not be verified for the following reasons:

i. "Follow-up sampling has not yet been completed by DPR." This means that at the cutoff date for the preparation of the well inventory report (usually 6-10 months before the release of the report) verification had not yet been completed for the pesticide-related compound.

ii. "Sampling was not conducted by DPR" because the detection occurred in a ground water protection area (GWPA) and the compound detected was on the 6800(a) list of known ground water contaminants. Regulations for 6800(a) compounds already exists in these areas making it unnecessary to verify additional reported detections.

iii. The detection may have been referred to SWRCB for the following reasons: the pesticides were not currently registered for use; the pesticides were registered for other than agricultural, outdoor industrial, or outdoor institutional uses; or the pesticides were found in ground water, but were determined not to be the result of legal agricultural use.

iv. "There may be no wells available for sampling." The original well is not available for sampling because it has been destroyed (the standard term for sealing and closing a well), or is no longer functioning as a well. In addition, the original well may have been a monitoring well, usually reported by the U.S. Geological Survey (USGS), and there are no other wells within a four-section area available for sampling. Since monitoring wells require special equipment for sampling, they are not sampled by DPR unless there

are other wells within a four-section area that can be sampled to help determine whether residues are due to legal agricultural use.

v. "Permission to sample could not be obtained from the well owner or manager." Historically, DPR has only sampled wells with the permission of the well owner. Therefore, if a well has been sampled and the owner decides not to permit additional sampling, DPR would not be able to verify any reported detection in that well. Well owners rarely deny DPR permission to sample a well.

vi. "The detection reported by another agency was below 80 percent of the current MDL established by the California Department of Food and Agriculture (CDFA) laboratory ." Some reports of pesticide residue detections are at levels far below the MDL obtainable by laboratories approved by DPR. Any attempt to verify these detections by DPR would be futile. Verifying these detections would be reconsidered if the CDFA laboratory's MDL is set lower.

vii. "DPR conducted sampling in response to a detection and did not detect the compound under investigation." This means that DPR was unable to verify the presence of the pesticide in the well as a result of analysis of a back-up sample or a subsequent sample taken.

A verified detection is the only type of detection that DPR uses for the basis of regulatory action.

Data Summary

1. Data in this report are the result of seven well sampling surveys
2. Data represent 3,966 wells in 52 counties that were sampled for 152 pesticide-related compounds. Ninety-nine percent of the wells sampled were municipal or domestic drinking water wells.
3. Twenty-four compounds were reported with detections. Fourteen detections were verified detections.

Tables I-1a and I-1b provide an annual and cumulative summary of the number of wells and the number of pesticides sampled throughout California for data submitted to DPR by June 30, 2005.

Table I-1a. Annual and cumulative summary of the number of wells sampled and their detection status, and the number of counties where samples were collected.

Category	Year 2005	Total[b] 1985-2005
Total **wells** sampled	3,966	22,297
Wells with no detections	3,528	17,351
Wells with detections [a]	438	4,946
Wells with verified detections	79	1,012
Total **counties** sampled	52	58
Counties with no detections	27	8
Counties with detections [a]	25	50
Counties with verified detections	3	33

(a) Includes both verified and unverified detections. Detections of pesticide residues are verified if either the analytical method provides unequivocal identification of a chemical as approved by DPR or the residues were detected within 30 days using a second analytical method or a second analytical laboratory approved by DPR.

(b) The total represents unique wells sampled in a county where a single well with sampling data reported in more than one year is counted only once.

Table I-1b. Annual and cumulative summary of the number of pesticide-related compounds analyzed, the number of compounds with detections and the number of compounds where DPR determined that detections were the result of non-point source pesticide applications.

Category	Year 2005	Total[b] 1985-2005
Total **pesticide-related** compounds analyzed	152	336
Compounds with no detections	128	227
Compounds with detections [a]	24	109
Compounds with verified detections	14	30
Compounds with detections in ground water as a result of non-point source pesticide applications	14 [c]	19 [d]

(a) Includes both verified and unverified detections. Detections of pesticide residues are verified if either the analytical method provides unequivocal identification of a chemical as approved by DPR or the residues were detected within 30 days using a second analytical method or a second analytical laboratory approved by DPR.

(b) The total represents unique compounds analyzed where a single compound that had sampling data reported in more than one year is counted only once.

(c) The fourteen compounds are atrazine, bromacil, diuron, prometon, simazine, hexazinone, norflurazon, deethyl-atrazine, ACET, DACT, alachlor ethanesulfonic acid, metolachlor oxanilic acid, metolachlor ethanesulfonic acid, demethylnorflurazon.

(d) The 19 compounds are 1,2-D, ACET, aldicarb sulfone, aldicarb sulfoxide, atrazine, bentazon, bromacil, DBCP, DEA, DACT, diuron, EDB, norflurazon, demethylnorflurazon, prometon, simazine, metolachlor oxanilic acid metolachlor ethanesulfonic acid, alachlor oxanilic acid, alachlor ethanesulfonic acid and 2,3,5,6-trachloroterephthalic acid (TPA). See Appendix C for more information on individual compounds.

Results by Reporting Agency

The results of seven well sampling surveys were reported to DPR, five of which had data that were added to the well inventory database from July 1, 2004, to June 30, 2005. Two of the surveys resulted in a determination that the reported detections of diazinon and methyl bromide were due to a transcription error (see Appendix B for greater detail). One of the surveys was from sampling conducted between October 2001 and May 2003 and another from sampling conducted in August 2002. The data represent 3,966 wells in 52 counties that were sampled for 152 pesticide-related compounds. Table I-2 summarizes the data added to the database by sampling agency.

Ninety-nine percent of these wells were public or private drinking water wells. The other wells were non-drinking water or unused, or the well type was unknown.

Table I-2. Summary, by agency, of records in the well inventory database for the reporting period July 1, 2004, to June 30, 2005.

Sampling Agency	Wells	Counties	Chemicals Analyzed	Wells with Detections	Records Added to Database
DHS	3,882	52	142	359	128,865
USGS	2	2	1	2	2
DPR	84	3	17	79	3772

Results by County

The number of wells sampled in each county varied widely, from 725 wells in Los Angeles County to one well in Colusa, Humbolt, and Imperial counties. Data were not reported for six counties -- Alpine, Calaveras, Lassen, San Francisco, Sierra and Trinity. Table I-3 summarizes, by county, the number of pesticide-related compounds analyzed, the number of wells sampled, and the number of wells with verified and unverified detections. Appendix A lists specific compounds that were sampled in each county and identifies the number of wells sampled and the number of wells with reported detections for each compound reported from July 1, 2004, to June 30, 2005.

Table I-3. Summary, by county, of the number of pesticide-related compounds analyzed, the number of wells sampled, and the number of wells with unverified and verified detections. Wells may have both unverified and verified detections. Results are for data reported from July 1, 2004, to June 30, 2005.

County	Number of Compounds Sampled	Number of Wells Sampled	Wells with Unverified Detections	Wells with Verified Detections
Fresno	63	393	111	50
Tulare	65	193	46	23
Stanislaus	63	157	42	6

County	Number of Compounds Sampled	Number of Wells Sampled	Wells with Unverified Detections	Wells with Verified Detections
San Bernardino	65	345	53	0
Kern	79	272	25	0
San Joaquin	59	107	23	0
Merced	57	38	14	0
Riverside	62	173	11	0
Los Angeles	101	725	10	0
Madera	44	35	4	0
Monterey	74	110	3	0
Butte	32	57	2	0
Kings	53	32	2	0
Orange	83	226	2	0
Sacramento	73	241	2	0
Yuba	34	29	2	0
Contra Costa	60	27	1	0
Del Norte	11	2	1	0
Inyo	58	5	1	0
San Diego	75	60	1	0
San Luis Obispo	61	78	1	0
San Mateo	63	25	1	0
Santa Clara	69	158	1	0
Sonoma	82	84	1	0
Ventura	57	54	1	0
Alameda	64	24	0	0
Amador	24	2	0	0
Colusa	24	1	0	0
El Dorado	10	20	0	0
Glenn	11	9	0	0
Humboldt	7	1	0	0
Imperial	13	1	0	0
Lake	75	10	0	0
Marin	37	4	0	0
Mariposa	46	14	0	0
Mendocino	76	17	0	0
Modoc	17	2	0	0
Mono	11	2	0	0
Napa	61	12	0	0
Nevada	48	5	0	0
Placer	61	15	0	0
Plumas	11	11	0	0
San Benito	41	6	0	0
Santa Barbara	60	46	0	0
Santa Cruz	59	32	0	0
Shasta	16	17	0	0
Siskiyou	38	2	0	0

County	Number of Compounds Sampled	Number of Wells Sampled	Wells with Unverified Detections	Wells with Verified Detections
Solano	49	16	0	0
Sutter	13	3	0	0
Tehama	6	11	0	0
Tuolumne	25	26	0	0
Yolo	93	31	0	0

Results by Pesticide

Sampling results from July 1, 2004, to June 30, 2005 were reported for 152 pesticide-related compounds. Among the 24 detected compounds, 14 were verified detections. Verified detections were the result of sampling conducted by the DPR (see Appendix B for a detailed summary of the study). Table I-4 summarizes, by pesticide-related compounds, the number of counties where wells were sampled, the number of wells sampled, and the number of wells that had verified and unverified detections. Most wells were sampled for more than one compound.

Table I-4. Summary, by pesticide-related compounds, of the number of counties where wells were sampled, the number of wells sampled and the number of wells with verified and unverified detections. Most wells were sampled for more than one compound. Results are for data reported from July 1, 2004, to June 30, 2005

Chemical	Number of Counties Sampled	Number of Wells Sampled	Wells with Unverified Detections	Wells with Verified Detections
ACET	3	84	0	73
DACT	3	84	0	71
Simazine	42	1620	1	68
Diuron	22	349	0	49
Bromacil	37	1348	0	32
Demethylnorflurazon	3	80	0	32
Norflurazon	3	84	0	22
Deethyl-atrazine	3	84	0	10
Metolachlor ESA	2	12	0	6
Atrazine	42	1613	2	3
Hexazinone	4	85	0	2
Alachlor ESA	2	12	0	1
Metolachlor OXA	2	12	0	1
Prometon	7	255	0	1
Diazinon	35	801	1	0
Methyl Bromide (bromomethane)	51	2783	1	0
(S)-metolachlor	2	12	2	0
Benzene (benzol)	50	3271	5	0
Xylene	51	3060	6	0

Chemical	Number of Counties Sampled	Number of Wells Sampled	Wells with Unverified Detections	Wells with Verified Detections
1,2-dichloropropane	50	3240	8	0
Chloromethane (methyl chloride)	51	2782	9	0
Chlorthal-dimethyl Acid Breakdown products	25	282	9	0
Ethylene Dibromide	40	1697	14	0
DBCP	40	1745	318	0
1,1,2,2-tetrachloroethane	50	3250	0	0
1,2,4-trichlorobenzene	50	3194	0	0
1,2-D + 1,3-D + C-3 compounds	51	2910	0	0
1,3-dichloropropene (1,3-d)	20	731	0	0
2,3,7,8-TCDD (dioxin)	20	373	0	0
2,4,5-T	29	301	0	0
2,4,5-TP (silvex)	35	671	0	0
2,4,6-trichlorophenol	1	16	0	0
2,4-D	36	673	0	0
2,4-dinitrophenol	1	3	0	0
3-hydroxycarbofuran	32	629	0	0
4(2,4-DB) - dimethylamine salt	12	69	0	0
Acenaphthene	6	47	0	0
Acephate	1	2	0	0
Acetochlor	18	198	0	0
Acifluorfen, Sodium Salt	9	44	0	0
Acrylonitrile	3	9	0	0
Alachlor	41	1398	0	0
Alachlor OXA	2	12	0	0
Aldicarb	32	642	0	0
Aldicarb Sulfone	32	641	0	0
Aldicarb Sulfoxide	32	641	0	0
Aldrin	33	590	0	0
Ametryne	2	2	0	0
Aminocarb	1	1	0	0
Atraton	1	11	0	0
Barban	1	1	0	0
Benefin (benfluralin)	1	1	0	0
Bentazon, Sodium Salt	35	667	0	0
BHC (other than gamma isomer)	6	56	0	0
Butachlor	37	1256	0	0
Butylate	2	2	0	0
Captan	1	2	0	0
Carbaryl	32	636	0	0
Carbofuran	34	658	0	0
Carbon Disulfide	13	169	0	0
Chlordane	35	616	0	0
Chlorobenzilate	3	9	0	0

Chemical	Number of Counties Sampled	Number of Wells Sampled	Wells with Unverified Detections	Wells with Verified Detections
Chloroneb	4	10	0	0
Chlorothalonil	31	424	0	0
Chlorpropham	2	3	0	0
Chlorpyrifos	1	1	0	0
Dacthal	4	25	0	0
Coumaphos	1	2	0	0
Cycloate	2	2	0	0
Dalapon	35	669	0	0
DDD	6	46	0	0
DDE	20	211	0	0
DDT	9	67	0	0
DDVP (dichlorvos)	1	1	0	0
Demeton	2	3	0	0
Dicamba	34	657	0	0
Dichlorprop, Butoxyethanol Ester	8	42	0	0
Dieldrin	33	585	0	0
Dimethoate	37	1240	0	0
Dinoseb	35	670	0	0
Diphenamid	3	4	0	0
Diquat Dibromide	34	724	0	0
Disulfoton	3	19	0	0
Endosulfan	5	45	0	0
Endosulfan Sulfate	5	45	0	0
Endothall	31	643	0	0
Endrin	35	637	0	0
Endrin Aldehyde	5	45	0	0
EPN	1	2	0	0
EPTC	19	166	0	0
Ethion	1	2	0	0
Fenamiphos	1	1	0	0
Fensulfothion	1	2	0	0
Fenthion	1	2	0	0
Fenuron	1	1	0	0
Fenuron Trichloroacetate (TCA)	1	1	0	0
Fluometuron	1	1	0	0
Fonofos (dyfonate)	1	16	0	0
Glyphosate, Isopropylamine Salt	29	512	0	0
Heptachlor	35	633	0	0
Heptachlor Epoxide	35	636	0	0
Hexachlorobenzene	35	650	0	0
Lindane (gamma-BHC)	35	642	0	0
Linuron	2	6	0	0
Malathion	2	156	0	0

Chemical	Number of Counties Sampled	Number of Wells Sampled	Wells with Unverified Detections	Wells with Verified Detections
MCPA, Dimethylamine Salt	1	1	0	0
MCPP	1	1	0	0
Merphos	2	3	0	0
Methiocarb	15	80	0	0
Methomyl	32	637	0	0
Methoxychlor	35	645	0	0
Methyl Parathion	2	154	0	0
Metolachlor	37	1273	0	0
Metribuzin	37	1273	0	0
Mexacarbate	1	1	0	0
Molinate	40	1452	0	0
Monuron	1	1	0	0
Monuron-TCA	1	1	0	0
Naled	1	2	0	0
Naphthalene	50	2467	0	0
Napropamide	2	2	0	0
Neburon	1	1	0	0
Ortho-dichlorobenzene	50	3253	0	0
Oxamyl	34	666	0	0
Paraquat Dichloride	6	153	0	0
Parathion or Ethyl Parathion	2	154	0	0
Pendimethalin	1	1	0	0
Pentachloronitrobenzene (PCNB)	2	3	0	0
Permethrin	4	10	0	0
Permethrin, other related	3	9	0	0
Phorate	1	2	0	0
Picloram	35	666	0	0
Prometryn	37	1238	0	0
Propachlor	37	1216	0	0
Propazine	6	24	0	0
Propham	1	1	0	0
Propoxur	14	60	0	0
Ronnel	1	2	0	0
Secbumeton	1	11	0	0
Siduron	1	1	0	0
Simetryn	2	2	0	0
Tebuthiuron	1	1	0	0
Terbacil	18	177	0	0
Terbutryn	3	13	0	0
Tetrachlorvinphos (stirofos)	2	3	0	0
Thiobencarb	40	1445	0	0
Toxaphene	35	619	0	0
Triadimefon	2	2	0	0

Chemical	Number of Counties Sampled	Number of Wells Sampled	Wells with Unverified Detections	Wells with Verified Detections
Trichlorobenzenes	51	2902	0	0
Trichloronate	1	2	0	0
Trifluralin	12	51	0	0
Vernolate	2	2	0	0

Status of Pesticides with Verified Detections

Detections were verified in 79 wells in three counties. Table I-5 summarizes, by county and pesticide, the number of wells with verified detections. In 2004, DPR requested that the norflurazon breakdown product, demethylnorflurazon (DMN), be added to the triazine pesticide screen. During a study conducted this year by DPR to look for metolachlor, DMN residue was detected for the first time in Stanislaus County. Wells in Fresno and Tulare County, which are part of the 70-well network sampled annually by DPR, were also reported to contain residues of DMN.

Table I-5. Summary, by county and pesticide, of the number of wells with verified detections. Results are for data reported from July 1, 2004, to June 30, 2005.

County	alachlor ESA	atrazine	DEA	bromacil	diuron	hexazinone	metolachlor ESA	metolachlor OXA	norflurazon	demethylnorflurazon	prometon	simazine	ACET	DACT	**Total Wells**
Fresno		2	6	17	32	1			14	21	1	48	49	46	50
Stanislaus	1			1		1	5	1		2[(a)]			2	5	6
Tulare		1	4	14	17		1		8	9		20	22	20	23
Total Detections	1	3	10	32	49	2	6	1	22	32	1	68	73	71	79

(a) First time verified detection of this chemical in this county

The tables below summarize the year's major uses and total pounds applied in California for the AI of the pesticide that had verified detections of the parent compound or its Breakdown product. Maximum contamination levels and health advisory levels for each compound were obtained from the Central Valley Regional Water Quality Control Board's Compilation of Water Quality Goals, August 2003. The pesticide use information in the following tables was obtained from the 2004 pesticide use database (PUR).

Alachlor

Alachlor is a selective herbicide used to control most annual grasses and certain broadleaf weeds in corn, beans, peanuts and soybeans. No alachlor was detected in California ground water; however, DPR verified one detection of the alachlor breakdown product, alachlor ESA, at 0.077 ppb.

The following sites represent the major uses of alachlor reported in 2004.

Site	Pounds
Corn, human consumption	10,743
Beans (all or unspecified)	8,228
Corn (forage - fodder)	3,644
Beans, dried-type	2,411
Beans, succulent (other than lima)	1,693
Soil application, preplant-outdoor	90

DHS has established an MCL for alachlor at 2 ppb.

Atrazine

Atrazine is a selective herbicide. This compound is listed on the 6800(a) list of compounds that have been found in California ground water. DPR regulations require users who apply compounds on this list in leaching and runoff GWPAs to follow specific management practices (see section on pesticide management practices) to prevent movement to ground water.

The following sites represent the major uses of atrazine reported in 2004.

Site	Pounds
Forest Trees, Forest Lands	10,045
Corn (forage - fodder)	7,228
Corn, human consumption	6,912
Sudangrass (forage - fodder)	6,204
Bermudagrass (forage - fodder)	5,276
Sorghum/milo General	532
All Other	934

The highest residue level of atrazine verified by DPR was 0.14 ppb. DHS and U. S. EPA have established an MCL for atrazine at 1 ppb.

Bromacil

Bromacil is a selective herbicide primarily used for weed control in rights-of-way and citrus crops. Bromacil is listed on the 6800(a) list of compounds that have been found in California ground water. DPR regulations require users who apply compounds on this list in leaching and runoff GWPAs to follow specific management practices (see section on pesticide management practices) to prevent movement to ground water.

The following sites represent the major uses of simazine reported in 2004.

Site	Pounds
Rights of Way	23,128
Orange (all or unspecified)	21,740
Lemon	2,880
Landscape Maintenance	2,643
Grapefruit	2,371
Tangerine	1,001
All Other	1,455

The highest residue level of bromacil verified by DPR was 6.06 ppb. No MCL has been established for bromacil. U. S. EPA has established a drinking water advisory level (HAL) for bromacil at 90 ppb.

Diuron

Diuron is a preemergence herbicide. Its major uses are controlling grass weeds in rights-of-way, alfalfa and citrus crops. Diuron is listed on the 6800(a) list of compounds that have been found in California ground water. DPR regulations require users who apply compounds on this list in leaching and runoff GWPAs to follow specific management practices (see section on pesticide management practices) to prevent movement to ground water.

The following sites represent the major uses of diuron reported in 2004.

Site	Pounds
Rights of Way	663,290
Alfalfa (forage - fodder)	294,162
Orange (all or unspecified)	167,291
Walnut	39,353
Grapes	37,351
Landscape Maintenance	36,832
All Other	117,872

The highest residue level of diuron verified by DPR was 1.08 ppb. No MCL has been established for diuron. The U.S. EPA HAL is 10 ppb.

Hexazinone

Hexazinone is a selective herbicide used for weed control in alfalfa and forest trees. The highest residue level of hexazinone verified by DPR was 0.263 ppb. No MCL has been established for hexazinone. The U.S. EPA HAL is 400 ppb.

The following sites represent the major uses of hexazinone reported in 2004.

Site	Pounds
Alfalfa (forage - fodder)	77,422
Forest Trees, Forest Lands	25,735
Rights Of Way	2,189
Regulatory Pest Control	343
Christmas Tree Plantations	124
All Other	71

Metolachlor

Metolachlor is a preemergence herbicide that is no longer registered for use in California. However, one of its isomers, (s)-metolachlor is registered and the use reported in the table below is of the metolachlor isomer. The majority of use in California is for weed control in tomato, cotton and corn crops. No metolachlor was detected in California ground water; however, DPR verified detections of the breakdown products, metolachlor ESA and OXA. The highest residue level was 1.1 and 0.279 ppb, respectively. No MCL has been established for metolachlor. The U.S. EPA HAL is 100 ppb.

The following sites represent the major uses of metolachlor reported in 2004.

Site	Pounds
Tomatoes, for processing/canning	174,178
Cotton, general	129,968
Corn (forage - fodder)	30,629
Beans, dried-type	20,263
Tomato	10,406
Beans, succulent (other than lima)	10,867
All other	15,957

Norflurazon

Norflurazon is a selective herbicide used primarily to control grasses and broadleaf weeds in tree, alfalfa, citrus and vine crops. Norflurazon is listed on the 6800(a) list of compounds that have been found in California ground water. DPR regulations require users who apply compounds on this list in leaching and runoff GWPAs to follow specific management practices (see section on pesticide management practices) to prevent movement to ground water.

The following sites represent the major uses of norflurazon reported in 2004.

Site	Pounds
Almond	39,558
Alfalfa (forage - fodder)	29,643
Orange (all or unspecified)	10,524
Grapes	10,236
Rights Of Way	9,031
Avocado (all or unspecified)	8,838
All Other	31,683

The highest residue level of norflurazon verified by DPR was 1.62 ppb. There are no drinking water quality limits for norflurazon.

Prometon

Prometon is a selective herbicide used to control most annual, many perennial broadleaf weeds and grasses for a full season or longer. Prometon is listed on the 6800(a) list of compounds that have been found in California ground water. DPR regulations require users who apply compounds on this list in leaching and runoff GWPAs to follow specific management practices (see section on pesticide management practices) to prevent movement to ground water.

The following sites represent the major uses of simazine reported in 2004.

Site	Pounds
Rights Of Way	17
Landscape Maintenance	2
Outdoor, Container, or Field Grown Plants	1

The highest residue level of prometon verified by DPR was 0.093 ppb. No MCL has been established for prometon. The U.S. EPA HAL is 100 ppb.

Simazine

Simazine is a selective herbicide. Its major uses are controlling grass and broadleaf weeds in citrus, vine and nut crops and in rights or way. Simazine is listed on the 6800(a) list of compounds that have been found in California ground water. DPR regulations require users who apply compounds on this list in leaching and runoff GWPAs to follow specific management practices (see section on pesticide management practices) to prevent movement to ground water.

The following sites represent the major uses of simazine reported in 2004.

Site	Pounds
Orange (all or unspecified)	187,311
Grapes, Wine	123,474
Grapes	122,724
Almond	73,980
Rights Of Way	73,610
Walnut	51,726
Landscape Maintenance	17,541
All Other	74,013

The highest residue level of simazine verified by DPR was 0.516 ppb. DHS and U. S. EPA have established an MCL for simazine at 4 ppb.

Status of Unverified Detections

Samples with unverified detections were either referred to SWRCB or investigated by DPR. They were referred to SWRCB for the following reasons: the pesticides were not currently registered for use; the pesticides were registered for other than agricultural, outdoor industrial, or outdoor institutional uses; or the pesticides were found in ground water, but were determined not to be the result of legal agricultural use. SWRCB and its nine regional boards are responsible for protecting the beneficial uses of water in California and for controlling all discharges of waste into waters of the State. Most detections that are reported to DPR where the pesticide product containing the AI detected is currently registered for agricultural, outdoor industrial, or outdoor institutional uses in California would be investigated by DPR. However, there are two exceptions to this rule. DPR will not further investigate a report of a detection (1) if the detected residue is from a compound that is listed on the 6800(a) list of known ground water contaminates and the detection occurred in a GWPA or (2) if the detection is below 80 percent of the MDL established by a lab approved by DPR.

The status of all positive samples (verified and unverified) added to the database is summarized in Appendix C. It includes the historical range of concentrations for compounds detected in ground water and, if a detection occurred, the detection levels reported during this fiscal year, from July 1, 2004, to June 30, 2005. Of the 132,639 records added to the well inventory database this year, there were 375 unverified detections from 3,966 wells in 52 counties for a total of 12 pesticide-related compounds. Ninety-five percent of these detections were of five chemicals not

registered in California or not registered for agricultural use. The chemicals were 1,2-dichloropropane, benzene, chloromethane, DBCP, xylene. These detections were reported to SWRCB.

DHS reported detections of diazinon, methyl bromide and dacthal acid breakdown products (TPA). DPR's investigation into the diazinon detection determined the reports were in error. DPR did not investigate detections of TPA because at the levels present in ground water, TPA does not pose a threat to public health (Miller C., et al, 1992). The methyl bromide detection is currently being investigated by DPR.

II. PREVENTION OF PESTICIDE MOVEMENT TO GROUND WATER AS A RESULT OF LEGAL AGRICULTUAL APPLICATIONS

Discussion

Pesticides in soil gradually disappear from the site of deposition in a number of ways including photolysis; volatilization; microbial degradation; chemical degradation, such as hydrolysis; leaching; or runoff. In the event of runoff or leaching, some pesticides, usually those applied directly to soil, can move to ground water. Once ground water contamination occurs it is very difficult and costly to remove the pesticide residue. Therefore, the best way to protect ground water is to regulate pesticide use before contamination can occur.

The Pesticide Contamination Prevention Act requires DPR to take regulatory action to protect ground water only after a pesticide has been first detected in ground water due to legal, agricultural use. However, once a pesticide is found in ground water, the director may determine that use can be modified so that there is a high probability that the pesticide will not pollute the ground waters of the state. Initially, DPR adopted use modifications that applied only where pesticides were found in ground water because vulnerability was only associated with detections. In some cases, the detected pesticide was prohibited in vulnerable areas. The problem with prohibiting use is that users often substitute other pesticides with the same environmental fate characteristics. As a result, eventually the substituted pesticide can also move to ground water.

Over time, DPR and other agencies have sampled many wells under a variety of soil, depth-to-ground water, and climatic conditions. As this monitoring data accumulated in the well inventory database, DPR was able to begin analyzing the relationship between detections and these other factors to determine if vulnerability could be determined before contamination actually occurs. In the 1990's, DPR scientists were able to develop the California vulnerability modeling (CALVUL) approach, which was used to determine vulnerable areas in California based on soil characteristics and depth-to-ground water data. Information on the CALVUL modeling approach can be found at http://www.cdpr.ca.gov/docs/gwp/index.htm. This approach related geographical factors to areas with known ground water contamination (Troiano, et al., 1994). Each section of land for which soil and depth-to-ground water data was available was screened to determine if it fit any of the profiles that characterize vulnerable areas; in coarse, permeable soils, residues leach with water during normal percolation processes and in less permeable soils with a hardpan layer, residues are moved offsite in runoff water to sensitive sites (Braun and Hawkins, 1991). Pesticide application management practices were developed based on the predominant soils in these vulnerable areas (Troiano et al., 2000). Sections of land meeting the vulnerable profiles and for which mitigation measures are available were designated GWPAs (Troiano, et al., 1997). DPR has identified 3,718 GWPAs as sections in coarse or hardpan soil clusters that have depth-to-ground water at 70 feet or shallower. In addition, all previous PMZs not classified by CALVUL were designated GWPAs. Effective May 27, 2004,

DPR's new regulations allow continued use of ground water contaminants if users can comply with new use restrictions (management practices) in GWPAs and restrictions that apply inside canal and ditch banks and artificial recharge basins.

The following section summarizes the factors that contribute to pesticide movement to ground water and provides details of the pesticide application management practices specified in regulation that will help to prevent contamination of ground water.

Factors that Contribute to Pesticide Movement to Ground Water

Pesticide Factors

The physical and chemical characteristics thought to be important in movement through soil are water solubility, soil adsorption coefficient, anaerobic and aerobic soil metabolism, hydrolysis and field dissipation. Under FAC section 13144, DPR is required to establish SNVs for these characteristics. To date, the SNVs have been established for water solubility, soil adsorption (Koc), and ½-lives for hydrolysis, aerobic and anaerobic soil metabolism by comparing the values for pesticides found in ground water to values for pesticides sampled for but not detected in ground water (Johnson 1991). When a value exceeds the SNV for water solubility or it is less than the SNV for Koc, the pesticide is considered mobile. When a value exceeds the ½-life SNVs for hydrolysis or soil metabolism, the pesticide is considered persistent. Pesticides that are both mobile and persistent are determined to have the potential to pollute ground water when they are applied directly to soil, or whose application is recommended or required by the label to be followed by flood or furrow irrigation within 72 hours.

Soil Characteristics

Soil characteristics that affect the movement of pesticides and subsequently the potential to contaminate ground water are:

1. The soil's water-holding and water retention properties.
2. Potential for compaction of the surface soil.
3. Soil components that bind with and retard movement of pesticide residues.
4. Presence of soil microbes that degrade pesticide residues.

Two soil properties that affect water-holding capacity are soil texture and organic carbon content. With respect to texture, water percolates to ground water much quicker in coarse-textured sandy soils than in clayey soils (Vereecken, et al., 1988). Coarse-textured soils have larger pore sizes, which allow for greater effect of gravitational forces to pull water down through the soil profile, as compared to clayey soils where the smaller pore sizes allow greater binding of water to soil particles, causing greater water retention. The organic carbon component of soil retains a large amount of water when wetted, so soils with higher organic carbon content will also have greater retention of water. Organic carbon content has been

included as a variable in equations to describe water-holding capacity of soils (Rawls and Brankensiek, 1985)

Surface soil compaction is another property that affects pesticide movement to ground water. Soils that are prone to compaction will shed water as runoff. Runoff water can contain residues of pesticides that eventually contaminate California's ground water (Braun and Hawkins, 1991). In areas prone to surface soil compaction, surface water is often collected and diverted to more porous subsurface soil to relieve potential flooding that could damage crops. In this situation, the potential for ground water contamination is high because water shunted to subsurface soil bypasses the principal soil microbial zone where most degradation of pesticide residues occurs.

Reaction of soil components with pesticide residues also affects pesticide movement through soil. Although the physical-chemical nature of a pesticide determines how likely it will interact with soil components, the amount of pesticide that reacts with soil is determined by the organic carbon content, and to a lesser extent the clay content, present in a soil (Mingelgrin and Gerstl, 1983). Numerous studies have indicated the importance of organic carbon content in sorption of pesticide residues where the amount of pesticide adsorbed per unit of soil directly increases as organic carbon content increases. Greater adsorption of pesticide residues results in less available for downward movement through the soil profile. Many soils in California are vulnerable to leaching because they are low in organic carbon content. Clay particles can be important because they react with pesticides that contain ionic charges. For example, paraquat is very polar and is highly reactive with the negative sites on the clay particles.

For pesticides that are incorporated into soil, the predominant pathway for degradation is metabolism by soil micro-flora, primarily bacteria and fungi. Thus, conditions that favor the presence and activity of soil micro-flora will also enhance degradation. For example, biological activity generally increases with increasing temperature so pesticides applied in cooler winter months will persist longer than pesticides applied in hotter summer months. Often, the soil micro-flora adapts to pesticide applications as indicated by faster rates of degradation measured after successive applications of pesticides (Suett and Jukes, 1988). Maintaining soil conditions that nurture soil microbial populations is important in ensuring fastest rates of biological degradation.

Irrigation Practices

Pesticide residues move with water that percolates into soil and eventually recharges ground water. The source of recharge water is either from natural rainfall or from irrigation used in crop production. Most areas of California experience a Mediterranean climate where significant rainfall occurs during the late fall and winter months and with very little rainfall during the rest of the year. The relative potential for downward movement of pesticide residues caused by rainfall and then by irrigation was investigated by DPR scientists in the 1980's. First, the effect

of rainfall on the movement of simazine was studied on a sandy soil in Fresno (Troiano and Garretson, 1988). Simazine was applied in November of 1987, exposed to the winter rains, and the soil cored to 10 feet in May of 1988. During that period, the site received 10 inches of natural rainfall, which also is the average rainfall in that area. Most simazine residues were confined to the first six inches of soil, indicating that the amount of percolating water produced during the winter months was not sufficient to cause significant downward movement of the residues. This is due to the pattern of rainfall where the 10 inches of water received by the experimental site was spread out over a number of months and with many rainfall events of one inch and below. In coarse textured soils, this pattern of water deposition allows for greater loss of water to evaporation rather than to percolation and thus results in limited downward movement of water and consequently pesticide residues. Similar results were observed in a rainfall study conducted in Riverside (Neal, et al., 1991).

Pesticide residues have been detected in ground water in areas with coarse-textured soils, indicating movement with water that recharges the ground water aquifer. The pattern of irrigation water applications is in stark contrast to precipitation events. Large amounts of water can be applied during each irrigation event, resulting in much larger potential losses of water to percolation. In a follow-up study, the influence of method and amount of irrigation water application was investigated on the movement of atrazine, a pre-emergent herbicide detected in ground water (Troiano, et al., 1993). This study demonstrated the effect that percolating water produced by irrigation has on downward movement of pesticide residues. Water treatments were based on a proportional measurement of reference crop evapotranspiration so that the smallest proportion produced the least amount of percolating water. There was a positive relationship between the proportioned water treatments and downward movement of atrazine; the smallest proportion produced the least amount of percolating water and the least downward movement of atrazine residues whereas the largest proportion produced the greatest downward movement of water and atrazine. Although this relationship was similar for different methods of irrigation water, the exact method of irrigation further affected the magnitude of atrazine leaching. For example, sprinkler irrigation was more effective than basin-flooding irrigation in limiting the downward movement of water and, subsequently, atrazine residues. Leaching was less in sprinkler applications because water could be applied more frequently in smaller applications than for the basin-flooding method. For basin-flooding treatments, a large amount of water application was required for each irrigation in order to provide application across the plot. Although irrigations were less frequent, the larger water volume caused greater downward movement of water and atrazine residues.

Climate

Another important contributing factor is regional climate, such as precipitation. In Del Norte County, the average annual rainfall is about 75 inches. One study, conducted in this region to determine downward movement of the pesticide fenamiphos attributed heavy rainfall to

fenamiphos residue moving well below the zone of application (Weaver, et al., 1988). Forty-two inches of rain fell between the time fenamiphos was applied in October and the first soil cores were collected in March. Another study used parameters from the Smith River Plains area in Del Norte County to input information into a computer model to simulate subsurface migration of a number of pesticides (Warner, et al., 1989). Concentrations of fenamiphos measured in the field study were compared with simulated concentrations generated from the computer model. Graphs of the measured and simulated values matched closely. In one particular simulation, staggering the application date of the pesticide by fifteen days resulted in the pesticide migrating deeper for all three years of the simulation. The difference in simulations was attributed to how closely the application date coincided with precipitation.

In another region, an opposite effect was observed in a study of the effect of winter rainfall on the movement of simazine in Fresno (Troiano and Garretson, 1988). In that study, the amount of winter rainfall was 10 inches, which was insufficient to move the major portion of simazine beyond the first six inches of sandy soil.

Pesticide Application Management Practices

The new ground water regulations include application management practices, which are specific to runoff and leaching GWPAs, engineered rights-of-ways within GWPAs, and inside canals and ditch banks and artificial recharge basins statewide. A runoff GWPA is associated with low infiltration rate soils that facilitate runoff and a leaching GWPA is associated with sandy soils where leaching can occur. Application management practices in hardpan soil (runoff) areas are as follows:

<u>Runoff GWPAs</u>

Use of 6800(a) pesticides is prohibited in runoff GWPAs unless one of the following management practices can be met and is designated by the County Agricultural Commissioner on the permit.

(a) Soil disturbance. Within seven days before the pesticide is applied, the soil to be treated shall be disturbed by using a disc, harrow, rotary tiller, or other mechanical method. This practice does not apply to bentazon, does not apply to the area to be treated that is immediately adjacent to the crop row and that does not exceed 33 percent of the distance between crop rows, and does not apply out to the drip line in citrus; or

(b) Incorporation of the pesticide. Within 48 hours after the day the pesticide is applied, the pesticide shall be incorporated on at least 90 percent of the area treated, using a disc, harrow, rotary tiller, or other mechanical method, or by sprinkler or low flow irrigation, including chemigation if allowed by the label. The irrigation should be applied using a minimum of ¼ inch of irrigation water and a maximum of either one inch or the maximum amount of irrigation water specified on the label, at application rates that do not cause surface water runoff from the treated property or to wells on the treated

property. This practice does not apply to bentazon, does not apply to the area that is immediately adjacent to the crop row and that does not exceed 33 percent of the distance between crop rows, and does not apply out to the drip line in citrus; or

(c) The pesticide shall be applied as a band treatment immediately adjacent to the crop row so that not more than 33 percent of the distance between rows is treated except in citrus where the treated band way extend out to the drip line of the tree; or

(d) The pesticide shall be applied between April 1 and July 31; or

(e) For six months following the application, the field shall be designed, by berms, levees, or non-draining circulation systems, to retain all irrigation runoff and all precipitation on, and drainage through, the field. The retention area on the field shall not have a percolation rate of more than 0.2 inches per hour (five inches per 24 hours) unless the drainage water is recirculated onto the field every 24 hours; or

(f) For six months following the application, runoff shall be channeled to a holding area off the application site, under the control of the property operator, that is designed to retain all irrigation runoff and all precipitation on, and drainage through, the treated field and all other areas draining into that holding area. The holding area shall not have a percolation rate of more than 0.2 inches per hour (five inches per 24 hours); or

(g) Runoff onto a fallow field. For six months following application, runoff shall be managed so that it runs off onto an adjacent unenclosed fallow field at least 300 feet long that is not irrigated for six months after application, with full consideration of any plant back restrictions; or

(h) An alternative management practice or pesticide approved by the Director as follows:

i. Upon written request, the Director may evaluate and approve use of alternative management practices that are based on scientific data demonstrating their effectiveness in reducing movement of pesticides to ground water; or

ii. Upon written request, the Director may make a determination to allow the interim use of a pesticide containing a chemical listed in section 6800(a) in a runoff GWPA, for a period not to exceed three years, while the requestor is documenting an alternate management practice according to a protocol approved by the director. This option is only available if none of the existing management practices are feasible for a given crop or site.

<u>Leaching GWPAs</u>

Use of 6800(a) pesticides is prohibited in leaching GWPAs unless any one of the following management practices can be met and is designated by the commissioner on the permit:

(a) The permittee shall not apply any irrigation water for six months following application of the pesticide; or

(b) The permittee shall apply the pesticide to the planting bed or the berm above the level of irrigation water in the furrow or basin for six months following application of the pesticide; or

(c) Irrigation shall be managed so that the ratio of the amount of irrigation water applied divided by the net irrigation requirement is 1.33 or less for six months following application of the pesticide; or
(d) An alternative management practice or pesticide approved by the Director

Artificial Recharge Basins

Use of pesticides registered for agricultural, outdoor industrial, and outdoor institutional use containing chemicals listed in section 6800(a) shall be prohibited below the high water line inside artificial recharge basins, unless the pesticide is applied six months or more before the basin is used to recharge ground water.

Inside Canals and Ditch Banks

Use of pesticides registered for agricultural, outdoor industrial, and outdoor institutional use containing chemicals listed in section 6800(a) shall be prohibited below the high water line inside unlined canals and ditches, unless at least one of the following applies:
(a) the pesticide user can document that the percolation rate of the canal or ditch is equal to or less than 0.2 inches per hour (0.002 gallons per minute per square foot); or
(b) the pesticide is applied six months before water is run in the canal or ditch.

Engineered Rights-of-Ways Within GWPAs

Use of pesticides registered for agricultural, outdoor industrial, and outdoor institutional use containing chemicals listed in section 6800(a) shall be prohibited on engineered rights-of-way in leaching or runoff ground water protection areas unless one of the following management options can be met and is designated by the commissioner on the permit:
(a) The property operator complies with section 6487.4; or
(b) Any runoff from the treated right-of-way shall pass through a noncrop fully vegetated area adjacent, and equal in area, to the treated area.
(c) The property operator complies with any permit issued pursuant to the storm water provisions of the federal Clean Water Act pertaining to the treated area; or
(d) An alternative management practice or pesticide approved by the Director.

Tops and Outer Banks of Canals and Rights of Way, within Runoff GWPAs

Use of pesticides registered for agricultural, outdoor industrial, and outdoor institutional use containing chemicals listed in section 6800(a) may be applied to the tops and outer banks of canals and to rights of way within runoff GWPAs where runoff from the treated site flows to an area equal in size to the area treated, slowly infiltrates into the soil, and does not move to ditches, dry wells, or permeable retention areas.

III. ACTIONS TAKEN BY DPR TO PREVENT MOVEMENT OF PESTICIDES TO GROUND WATER

Pesticide Detection Response Process (PDRP)

The PDRP is a process where detections of pesticide active ingredients currently registered for agricultural use or their breakdown products are investigated, evaluated and mitigated, when necessary. Historically, DPR responded to any reported detection in ground water if the detected pesticide was currently registered for agricultural use. The response to many of these detections was to sample five or six wells in a four-section area around the contaminated well. However, due to shrinking resources, DPR has established policies that allow for greater scrutiny of the detection before it is entered into the PDRP.

Each year DPR receives reports of detections from various agencies. For the first time, MDLs for some pesticides from submitted studies are below the MDLs obtainable by DPR laboratories. DPR's policy (memo from John Sanders to EM, July 2002) is not to respond to a detection if the concentration is below 80 percent of the current MDL established by the CDFA laboratory. DPR will also not respond to a detection of a pesticide listed in 6800(a) or its breakdown product in a GWPA. DPR has already adopted regulations that control the use of 3CCR section 6800(a) compounds in GWPAs. As in the past, all detections will be entered into the well inventory database so that the data can be included in future analysis of the database.

For detections entered into the PDRP, the investigative phase includes verification of the reported detection and an agricultural use determination. Some of the investigative activities include determining whether:

- The application of the pesticide in the vicinity of the detection was reasonably likely;
- A point source was not a likely cause;
- A non-agricultural use of the pesticide was not a likely source; or
- A non-pesticide source was not a likely cause.

DPR combines an analysis of pesticide use in the area where the detection occurred with land use and a four-section survey (see below) to help determine if the detection is due to legal agricultural use.

<u>Four-Section Survey</u>

The four-section survey is a well monitoring survey which is conducted to determine if there is a second contaminated well in the same area as the reported positive well. This helps to determine that the residue did not result from a point source. Samples are taken from the five or six wells in the section of land of the original detection or one or more of the three most adjacent sections and analyzed in order to confirm the initial detection. The location of a second positive well is

an indication that the detected residue may be the result of legal agricultural use and thus subject to the formal review process specified in FAC section 13149.

Verified detections of pesticide residues that are determined to be due to agricultural use and that have not been previously formally reviewed by the Director are subject to special review specified in FAC section 13150. The purpose of the review is to determine whether continued registration, sale, and use of the compound will be allowed. A subcommittee of the Pesticide Registration and Evaluation Committee holds a hearing, evaluates information, and makes recommendations to the Director of DPR, who then makes a determination regarding continued use of the compound in California.

DPR conducted two four-section surveys between July 1, 2004, and June 30, 2005, in response to reported detections of metolachlor. Both of the metolachlor surveys resulted in no detected residue of metolachlor. However, detections of other compounds occurred including the metolachlor breakdown products, metolachlor ethanesulfonic acid and oxanilic acid. Appendix B provides additional details for these studies.

Ground Water Protection List Monitoring

The Ground Water Protection List (GWPL) is a list of pesticides having the potential to pollute ground water. It was established according to FAC section 13145(d) and placed in section 6800 of Title 3 of the California Code of regulations (3CCR). The GWPL is divided into sub-lists (a) and (b). Section 6800(a) is comprised of chemicals detected in soil or ground water as a result of legal, agricultural use. Section 6800(b) includes chemicals that exceed the SNVs and (1) are intended to be applied to or injected into the soil by ground-based application equipment or by chemigation; or (2) where the pesticide labels recommend or require their application to be followed, within 72 hours, by flood or furrow irrigation. To determine whether the pesticides listed in 6800(b) have migrated to ground water, DPR is required to conduct ground water monitoring for them.

In 1992, 47 pesticide AIs were placed in section 6800(b). Regulations that became effective on May 13, 1999, added 15 new AIs to section 6800(b), bringing the total number of AIs on the list to 62. Since it was not possible to monitor for all 62 pesticides at once, DPR developed a protocol for selecting AIs for monitoring each year as resources allow. AIs on the list are evaluated for their potential to contaminate ground water based on their physicochemical characteristics, agricultural production practices for crops on which they are applied, target of application (soil versus foliar), information on recent detections in ground water or any other pertinent information.

In fiscal year 2004/2005, the EM Branch of DPR did not conduct a GWPL monitoring survey because the laboratory did not finalize the analytical method for the target active ingredient before the end of the year.

Monitoring Temporal Changes in Concentrations of Detected Herbicides and Their Degradates—Well Network Monitoring

The new regulations are more preventative than the past program because application management practices will be implemented in areas determined to be vulnerable to pesticide contamination but where pesticide residues have not yet been detected in ground water. One measure of success of the program will be to observe temporal changes in pesticide concentrations in wells that are known to contain residues. Beginning in 1999, DPR has sampled a group of 70 domestic wells in Fresno and Tulare counties. These wells were selected because previous sampling resulted in verified detections of one or more of the following pesticides—atrazine, simazine, bromacil, diuron, prometon and norflurazon—and because they are located in one of the two soil conditions identified as vulnerable to pesticide contamination, either coarse textured, sandy soil or hardpan soil.

The data gathered before the new regulations went into effect will be background data used to compare detected concentrations with concentrations after the new regulations were adopted. However, the effects of changing application management practices may not be discernible for at least a decade (Spurlock et al., 2000).

Holding Pond Mitigation Practices

Pesticides detected in San Joaquin County near Tracy were attributed to non-point source agricultural use. DPR determined that there were two most likely pathways of residues to ground water, holding ponds and vertisols, which are the cracking clay soils in the area. Most fields in the area had ponds located at one end that were used to collect irrigation runoff, often laden with pesticides. Inspection of the dried soils indicated large contiguous cracks that could serve as a conduit to ground water within the field. DPR established a protocol (Marade. J., 2000) to determine the source of contamination. The study (Prichard. T., et. al., 2005) found little downward movement in soil and determined that the most direct route for residues was from runoff water containing pesticides that drained into the holding ponds and infiltrated into the shallow ground water.

One mitigation measure was to recirculate the water collected in the ponds by pumping it back onto the field. Monitoring data gathered from a typical grower-operated recycling pond, which pumped water from the pond back onto the field (Prichard. T., et. al., 2004) showed a significant reduction (over 50 percent) of the pesticides hexazinone and diuron in the amount that infiltrated from the pond into ground water.

Chemigation Initiative

Chemigation is the application of pesticides through irrigation systems. It is increasing in popularity because of an increase in the use of pressurized irrigation systems and the cost-

effectiveness of applying pesticides by this method. Chemigation is a potential mitigation measure for both leaching and runoff GWPAs because pesticides can be placed and maintained at intended sites of application through management of the irrigation system. As part of the U.S. EPA's Label Improvement Program, the labels of pesticides that are chemigated must include specific instructions for use of backflow prevention devices to protect a water source injected with pesticides. DPR instituted the Chemigation Initiative to increase awareness of the current chemigation requirements through education and to determine the suitability of these requirements through the formation of a chemigation task force.

Chemigation Training

DPR is continuing to contract with the Center for Irrigation Technology, California State University Fresno (CIT) to provide chemigation training to the regulated community. Since 2001, CIT and DPR have provided 88 training sessions that focus on backflow prevention devices, and their alternatives, which are required installations on any chemigation system. The sessions include a manual to help growers understand and comply with the requirements, and a demonstration trailer that included an irrigation supply line equipped with the required backflow prevention devices and some of their alternatives. The manual can be accessed at http://www.cdpr.ca.gov/docs/gwp/chem/grower_manual.pdf. These training sessions will continue to be offered throughout the state in an effort to bring chemigation applications into compliance with the pesticide label requirements.

Chemigation Study

During 2004/2005, the Environmental Monitoring Branch contracted with CIT to develop data on the effectiveness of chemigation and to demonstrate the application of pre-emergence herbicides through low-volume irrigation systems. This was a cooperative study (Investigation and Demonstration of Applying Simazine and Diuron through Irrigation Systems) that included two cooperating citrus growers, registrants for simazine (Syngenta) and diuron (Griffin), DPR, and CIT technical staff. Irrigation systems of cooperating growers were evaluated and renovated as required for chemigation. For example, backflow prevention devices needed to be installed.

An important aspect of the study was to develop data demonstrating the effectiveness of chemigation. A proven method of change in the agricultural sector is to introduce the practice to a small segment of growers and test them for effectiveness on their property. Demonstrations are then conducted focusing on the grower's experience with the adoption of the practice. Both growers indicated that the control achieved through chemigation was very effective. Furthermore, the study resulted in the registrants requesting, with a letter of support from Citrus Mutual, and receiving a Section 24 C registration, which allows chemigation of simazine and diuron through micro-sprinkler irrigation systems on citrus.

Further investigations and demonstrations are planned to include other crops. Currently, the Section 24 C registration is only for use on citrus but both herbicides have a much wider range of use on deciduous tree fruit and nut crops and on grapes. The next study in 2005/2006 is planned to include deciduous tree crops.

Chemigation Task Force

DPR worked with CIT to form a task force to evaluate the need for further educational and regulatory action on chemigation applications. The task force is composed of irrigation specialists, representatives from the agricultural community, engineers with expertise in backflow prevention, representatives from the CAC, and other interested parties. The task force has met twice this year to discussed a variety of topics including alternative chemigation devices, consideration for a certification program, and best management practices for the timing and application of pesticides by chemigation. The task force will continue to meet to finalize the recommendations for changing the chemigation regulations and to discuss other pertinent issues regarding chemigation.

Chemigation Websites

Information about the Chemigation Initiative and chemigation requirements can be found on DPR website at http://www.cdpr.ca.gov/docs/gwp/chem.htm. These web pages include an overview of chemigation regulations, and provide descriptions and diagrams of the required devices and their alternatives for use during chemigation applications. The CIT website can be found at http://cati.csufresno.edu/cit/. California Polytechnic State University, San Luis Obispo also has a website providing backflow prevention information at www.itrc.org/chemigation.html. This site includes links to several documents pertaining to chemigation, including an article written by Dr. Charles M. Burt, "Chemigation and Fertigation Basics for California," which addresses questions about chemigation and irrigation management.

Ground Water Protection Training

In November and December 2004, DPR coordinated five irrigation training sessions conducted by UC irrigation specialists for the County Agricultural Commissioner (CAC) staff issuing permits for use of 6800(a) pesticides in leaching GWPAs. In June and September 2004, DPR conducted training sessions in seven locations for the CAC staff that provided the technical basis for the new regulations, reviewed the regulations themselves, and asked and answered questions about planned enforcement. DPR staff trained growers in six locations in 2004 and one location in 2005.

IV. ACTIONS TAKEN BY THE SWRCB AND IT' S REGIONAL BOARDS TO PREVENT PESTICIDES FROM ENTERING GROUND WATER NOVEMBER 2005.

The fourth section is a summary of the SWRCB's and the Regional Water Quality Control Board's (RWQCB) monitoring activities and is available at: http://www.cdpr.ca.gov/docs/empm/pubs/ehapreps/swrcb/ab2021_fy0405.pdf.

REFERENCES

Biermann, H. July 1989. Definition of a Second Analytical Method for the Purposes of AB2021 (memorandum). Department of Food and Agriculture, Sacramento, California. http://www.cdpr.ca.gov/docs/emon/grndwtr/polprocd/policy21.pdf (verified 1/14/08)

Biermann, H. July 1996. Definition of 'Unequivocal Detection Methods' for the Purposes of SB810 (memorandum). Department of Pesticide Regulation, Sacramento, California. http://www.cdpr.ca.gov/docs/emon/grndwtr/polprocd/policy10.pdf (verified 1/14/08)

Braun, A.L., and L.S. Hawkins. 1991. Presence of Bromacil, Diuron, and Simazine in Surface Water Runoff from Agricultural Fields and Non-Crop Sites in Tulare County, California. Pest Management Analysis and Planning Program, Department of Pesticide Regulation, California Environmental Protection Agency. Sacramento, California. PM 91-1. http://www.cdpr.ca.gov/docs/pestmgt/pubs/pm9101.pdf. (verified 1/14/08)

Johnson, B. 1991. Setting Revised Specific Numerical Values. Environmental Monitoring Branch, Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, California. EH 91-06. http://www.cdpr.ca.gov/docs/emon/pubs/ehapreps/eh9106.pdf (verified 1/14/08)

Marade, J. February 2000. Protocol. Evaluation and Prevention of Offsite Movement of Hexazinone and Diuron From An Alfalfa Field. Environmental Monitoring Branch, Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, California. Study 187. http://www.cdpr.ca.gov/docs/emon/pubs/protocol/prot187.pdf (verified 1/14/08)

Marshack, Jon B. 2003.A Compilation of Water Quality Goals. Central Valley Regional Water Quality Control Board, California Environmental Protection Agency.

Mingelgrin, U. and Z. Gerstl. 1983. Reevaluation of partitioning as a mechanism of nonionic chemicals adsorption in soils. J. Environ. Qual. 12:1-11.

Neal, R., R. Teso, T. Younglove, and D.L. Sheeks III. July 1991. Seasonal Rainfall Effects on Pesticide Leaching in Riverside. Environmental Monitoring Branch, Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, California. EH91-07. http://www.cdpr.ca.gov/docs/emon/pubs/ehapreps/eh9107.pdf (verified 1/14/08).

Prichard, T., J. Troiano, J. Marade, F. Guo, and M. Canevari. 2005. Movement of diuron and hexazinone in clay soil and infiltrated pond water. J. Environ. Qual. 34:2005-2017.

Prichard, T., L. Schwankl, and M. Canevari. September 2004. Develop Holding Pond Mitigation Practices to Prevent Herbicide Movement to the Ground Water. University of California Cooperative Extension in Cooperation with the Department of Pesticide Regulation. Environmental Monitoring Branch, California Environmental Protection Agency, Sacramento, California. EH04-03. http://www.cdpr.ca.gov/docs/emon/pubs/ehapreps/eh0403.pdf (verified 1/14/08).

Rawls, W.J. and K.L. Brakensiek. 1985. Agricultural management effects on soil water retention. In: DeCoursey, D.G. (ed.), Proceedings of the 1983 Natural Resources Modeling Symposium. U.S. Department of Agriculture, Agricultural Research Service, ARS-30, 532 p.

Sanders J. April 1994. Creating Pesticide Management Zones (PMZs) Based on Detections of Degradation Products of Pesticide Active Ingredients in Ground Water. To Gosselin P. (Issue memo). Environmental Monitoring Branch, Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, California. http://www.cdpr.ca.gov/docs/emon/grndwtr/index.htm (verified 1/14/08).

Sanders J. July 2002. Policy on Response to Certain Reported Detections of Pesticide in Ground Water. To EM staff (memorandum). Environmental Monitoring Branch, Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, California. http://www.cdpr.ca.gov/docs/emon/grndwtr/polprocd/gwp071202.pdf (verified 1/14/08).

Spurlock F. March 2000. Chlorofluorocarbon dating of herbicide-containing well waters in Fresno and Tulare counties, California. J. Environ. Qual. 29:474-483. http://www.cdpr.ca.gov/docs/emon/pubs/ehapref/chlordat.pdf (verified 1/14/08).

Suett, D. L. and A. A. Jukes. 1988. Evidence and implications of accelerated degradation of organophosphorus insecticides in soil. Toxicol. Environ. Chem. 18:37-49.

Troiano, J., F. Spurlock, and J. Marade. 2000. Update of the California Vulnerability Soil Analysis for Movement of Pesticides to Ground Water: October 14, 1999. Environmental Monitoring Branch, California Department of Pesticide Regulation, Sacramento, CA 95812-4015. EH 00-05. http://www.cdpr.ca.gov/docs/emon/pubs/ehapreps/eh0005.pdf (verified 7/16/05).

Troiano, J., C. Nordmark, T. Barry, and B. Johnson. 1997. Profiling areas of ground water contamination by pesticides in California: Phase II - evaluation and modification of a statistical model. Environ. Monitor. Assess. 45:301-318.

Troiano, J., B. Johnson, S. Powell, and S. Schoenig. August 1994. Use of cluster and principal component analysis to profile areas in California where ground water has been contaminated by pesticides. Environmental Monitoring and Assessment. 32: 269-288.

Troiano, J., C. Garretson, C. Krauter, J. Brownell, and J. Hutson. 1993. Influence of amount and method of irrigation water application on leaching of atrazine. J. Environ. Qual. 22: 290-298. http://www.cdpr.ca.gov/docs/emon/pubs/ehapref/atrzne.pdf (verified 01/15/08).

Troiano, J. and C. Garretson. January, 1988. Effects of Seasonal Rainfall on Pesticide Leaching in Fresno County. Environmental Monitoring Branch, Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, California. EH 88-02. http://www.cdpr.ca.gov/docs/emon/pubs/ehapreps/eh8802.pdf (verified 1/15/08).

Troiano, J. and C. Garretson. 1988. Soil Distribution of Simazine, Diazinon and Bromide in Sandy Soils after Exposure to 1985-86 Winter Rain in Fresno County. Environmental Monitoring Branch, Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, California. EH 88-02. http://www.cdpr.ca.gov/docs/emon/pubs/ehapreps/eh8802.pdf (verified 1/15/08).

Vereecken, H., J. Maes, J. Feyen, and P. Darius. 1988. Estimating the soil moisture retention characteristic from texture, bulk density, and carbon content. Soil Science 48:389-483.

Warner, S.A, H. Lundborg, D. Whyte, M.J. Heassler, and S. Gergus. 1989. Ground Water Pollution by Pesticides on the Smith River Plains Del Norte County. Regional Water Quality Control Board. North Coast Region, Santa Rosa, California.

Weaver D., January 1995. Notification Process for Well Monitoring Results of Pesticides in Ground Water. To Goh K. (memorandum). Environmental Monitoring and Pest Management Branch, Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, California. http://www.cdpr.ca.gov/docs/emon/grndwtr/polprocd/policy14.pdf (verified 1/15/08).

Weaver, D.J., V. Quan, C.N. Collison, N. Saini, and S.J. Marade. 1988. Monitoring the Persistence and Movement of Fenamiphos in Soils of Lily Bulb Fields in Del Norte County, 1986 Environmental Monitoring Branch, Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, California. EH 88-01. http://www.cdpr.ca.gov/docs/emon/pubs/ehapreps/eh8801.pdf (verified 1/15/08).

APPENDIX A

Number of Wells Sampled and Positive Detections, by County and Chemical

This appendix is presented in two parts. The first lists the counties without pesticide detections. The second lists the counties with pesticide detections. Click on the specific County for a list of pesticides analyzed and the number of wells sampled for each pesticide. Sampling results are reported for the period July 1, 2004 through June 30, 2005.

Part 1. Counties Sampled without Detections

Alameda
Amador
Colusa
El Dorado
Glenn
Humboldt
Imperial
Lake
Marin
Mariposa
Mendocino
Modoc
Mono
Napa
Nevada
Placer
Plumas
San Benito
Santa Barbara
Santa Cruz
Shasta
Siskiyou
Solano
Sutter
Tehama
Tuolumne
Yolo

Part 2. Counties Sampled with Detections

Butte
Contra Costa
Del Norte
Fresno
Inyo
Kern
Kings
Los Angeles
Madera
Merced
Monterey
Orange
Riverside
Sacramento
San Bernardino
San Diego
San Joaquin
San Luis Obispo
San Mateo
Santa Clara
Sonoma
Stanislaus
Tulare
Ventura
Yuba

Alameda	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	22
	1,2,4-Trichlorobenzene	22
	1,2-D + 1,3-D + C-3 Compounds	22
	1,2-Dichloropropane	22
	2,3,7,8-TCDD (dioxin)	15
	2,4,5-Tp (silvex)	13
	2,4-D	13
	3-hydroxycarbofuran	14
	Acenaphthene	2
	Acetochlor	2
	Alachlor	17
	Aldicarb	14
	Aldicarb Sulfone	14
	Aldicarb Sulfoxide	14
	Aldrin	17
	Atrazine	17
	Bentazon, Sodium Salt	13
	Benzene (benzol)	22
	Bromacil	14
	Butachlor	17
	Carbaryl	14
	Carbofuran	14
	Carbon Disulfide	1
	Chlordane	16
	Chloromethane (methyl chloride)	20
	Chlorothalonil	4
	Dacthal Acid Breakdown products	9
	Dalapon	13
	DBCP	16
	DDE	2
	Diazinon	14
	Dicamba	13
	Dieldrin	17
	Dimethoate	14
	Dinoseb	13
	Diquat Dibromide	14
	Diuron	14
	Endothall	14
	Endrin	17
	EPTC	2
	Ethylene Dibromide	16
	Glyphosate, Isopropylamine Salt	14
	Heptachlor	17
	Heptachlor Epoxide	17
	Hexachlorobenzene	17

Lindane (gamma-BHC)	17
Methomyl	14
Methoxychlor	17
Methyl Bromide (bromomethane)	20
Metolachlor	17
Metribuzin	17
Molinate	16
Naphthalene	22
Ortho-Dichlorobenzene	22
Oxamyl	14
Picloram	13
Prometryn	14
Propachlor	17
Simazine	17
Terbacil	2
Thiobencarb	16
Toxaphene	16
Trichlorobenzenes	22
Xylene	22

Amador	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	2
	1,2,4-Trichlorobenzene	2
	1,2-D + 1,3-D + C-3 Compounds	2
	1,2-Dichloropropane	2
	Alachlor	1
	Atrazine	1
	Benzene (benzol)	2
	Bromacil	1
	Butachlor	1
	Chloromethane (methyl chloride)	2
	Diazinon	1
	Dimethoate	1
	Methyl Bromide (bromomethane)	2
	Metolachlor	1
	Metribuzin	1
	Molinate	1
	Naphthalene	2
	Ortho-Dichlorobenzene	2
	Prometryn	1
	Propachlor	1
	Simazine	1
	Thiobencarb	1
	Trichlorobenzenes	2
	Xylene	1

Colusa	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	1
	1,2,4-Trichlorobenzene	1
	1,2-D + 1,3-D + C-3 Compounds	1
	1,2-Dichloropropane	1
	Alachlor	1
	Atrazine	1
	Benzene (benzol)	1
	Bromacil	1
	Butachlor	1
	Chloromethane (methyl chloride)	1
	Diazinon	1
	Dimethoate	1
	Methyl Bromide (bromomethane)	1
	Metolachlor	1
	Metribuzin	1
	Molinate	1
	Naphthalene	1
	Ortho-Dichlorobenzene	1
	Prometryn	1
	Propachlor	1
	Simazine	1
	Thiobencarb	1
	Trichlorobenzenes	1
	Xylene	1

El Dorado	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	20
	1,2,4-Trichlorobenzene	20
	1,2-D + 1,3-D + C-3 Compounds	9
	1,2-Dichloropropane	20
	Benzene (benzol)	20
	Chloromethane (methyl chloride)	9
	Methyl Bromide (bromomethane)	9
	Ortho-Dichlorobenzene	20
	Trichlorobenzenes	9
	Xylene	20

Glenn	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	9
	1,2,4-Trichlorobenzene	9
	1,2-D + 1,3-D + C-3 Compounds	9
	1,2-Dichloropropane	9
	Benzene (benzol)	9
	Chloromethane (methyl chloride)	2
	Methyl Bromide (bromomethane)	2
	Naphthalene	9
	Ortho-Dichlorobenzene	9
	Trichlorobenzenes	9
	Xylene	9

Humboldt	Chemical	Wells Sampled
	1,2-D + 1,3-D + C-3 Compounds	1
	Chloromethane (methyl chloride)	1
	Methyl Bromide (bromomethane)	1
	Naphthalene	1
	Thiobencarb	1
	Trichlorobenzenes	1
	Xylene	1

Imperial	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	1
	1,2,4-Trichlorobenzene	1
	1,2-D + 1,3-D + C-3 Compounds	1
	1,2-Dichloropropane	1
	Benzene (benzol)	1
	Chloromethane (methyl chloride)	1
	DBCP	1
	Ethylene Dibromide	1
	Methyl Bromide (bromomethane)	1
	Naphthalene	1
	Ortho-Dichlorobenzene	1
	Trichlorobenzenes	1
	Xylene	1

Lake	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	4
	1,2,4-Trichlorobenzene	3
	1,2-D + 1,3-D + C-3 Compounds	4
	1,2-Dichloropropane	4
	2,4,5-T	3
	2,4,5-Tp (silvex)	4
	2,4-D	4
	3-hydroxycarbofuran	2
	4(2,4-Db), Dimethylamine Salt	2
	Acephate	2
	Acifluorfen, Sodium Salt	2
	Acrylonitrile	1
	Alachlor	4
	Aldicarb	2
	Aldicarb Sulfone	2
	Aldicarb Sulfoxide	2
	Aldrin	4
	Atrazine	7
	Bentazon, Sodium Salt	3
	Benzene (benzol)	4
	Bhc (other Than Gamma Isomer)	4
	Bromacil	5
	Butachlor	5
	Carbaryl	2
	Carbofuran	2
	Chlordane	4
	Chlorobenzilate	2
	Chloromethane (methyl chloride)	4
	Chloroneb	2
	Chlorothalonil	4
	Dacthal Acid Breakdown products	3
	Dalapon	4
	DBCP	1
	DDD	4
	DDE	4
	DDT	4
	Diazinon	5
	Dicamba	3
	Dichlorprop, Butoxyethanol Ester	2
	Dieldrin	4
	Dimethoate	5
	Dinoseb	3
	Diquat Dibromide	2
	Endosulfan	4
	Endosulfan Sulfate	4

Endothall	2
Endrin	4
Endrin Aldehyde	4
Ethylene Dibromide	1
Heptachlor	4
Heptachlor Epoxide	4
Hexachlorobenzene	4
Lindane (gamma-BHC)	4
Methiocarb	1
Methomyl	2
Methoxychlor	4
Methyl Bromide (bromomethane)	4
Metolachlor	5
Metribuzin	5
Molinate	5
Naphthalene	1
Ortho-Dichlorobenzene	4
Oxamyl	2
Permethrin	2
Permethrin, Other Related	2
Picloram	3
Prometryn	5
Propachlor	6
Propoxur	1
Simazine	7
Thiobencarb	5
Toxaphene	4
Trichlorobenzenes	4
Trifluralin	3
Xylene	4

Marin	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	3
	1,2,4-Trichlorobenzene	3
	1,2-D + 1,3-D + C-3 Compounds	3
	1,2-Dichloropropane	3
	2,4,5-T	1
	2,4,5-Tp (silvex)	1
	2,4-D	2
	4(2,4-Db), Dimethylamine Salt	1
	Alachlor	1
	Aldrin	1
	Atrazine	2
	Bentazon, Sodium Salt	1
	Benzene (benzol)	3
	Chlordane	1
	Chloromethane (methyl chloride)	2
	Dalapon	1
	Dicamba	1
	Dieldrin	1
	Dinoseb	1
	Diquat Dibromide	1
	Endothall	1
	Endrin	1
	Ethylene Dibromide	1
	Heptachlor	1
	Heptachlor Epoxide	1
	Hexachlorobenzene	1
	Lindane (gamma-BHC)	1
	Methoxychlor	1
	Methyl Bromide (bromomethane)	2
	Naphthalene	1
	Ortho-Dichlorobenzene	3
	Oxamyl	1
	Picloram	1
	Simazine	2
	Toxaphene	1
	Trichlorobenzenes	3
	Xylene	3

Mariposa	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	5
	1,2,4-Trichlorobenzene	3
	1,2-D + 1,3-D + C-3 Compounds	5
	1,2-Dichloropropane	5
	Alachlor	8
	Ametryne	1
	Atrazine	10
	Benzene (benzol)	5
	Bromacil	8
	Butachlor	8
	Butylate	1
	Chloromethane (methyl chloride)	5
	Chlorpropham	1
	Cycloate	1
	DBCP	3
	Ddvp (dichlorvos)	1
	Demeton	1
	Dimethoate	8
	Diphenamid	1
	Disulfoton	1
	EPTC	1
	Ethylene Dibromide	3
	Fenamiphos	1
	Hexazinone	1
	Merphos	1
	Methyl Bromide (bromomethane)	5
	Metolachlor	8
	Metribuzin	8
	Molinate	8
	Naphthalene	3
	Napropamide	1
	Ortho-Dichlorobenzene	5
	Prometon	1
	Prometryn	8
	Propachlor	8
	Propazine	1
	Simazine	9
	Simetryn	1
	Tebuthiuron	1
	Terbutryn	1
	Tetrachlorvinphos (stirofos)	1
	Thiobencarb	8
	Triadimefon	1
	Trichlorobenzenes	5
	Vernolate	1
	Xylene	5

Mendocino	Chemical	Wells Sampled
	1,3-Dichloropropene (1,3-D Telone)	1
	1,1,2,2-Tetrachloroethane	3
	1,2,4-Trichlorobenzene	3
	1,2-D + 1,3-D + C-3 Compounds	3
	1,2-Dichloropropane	3
	2,4,5-T	11
	2,4,5-Tp (silvex)	11
	2,4-D	11
	3-hydroxycarbofuran	8
	4(2,4-Db), Dimethylamine Salt	11
	Acifluorfen, Sodium Salt	11
	Acrylonitrile	2
	Alachlor	10
	Aldicarb	8
	Aldicarb Sulfone	8
	Aldicarb Sulfoxide	8
	Aldrin	3
	Atrazine	11
	Bentazon, Sodium Salt	11
	Benzene (benzol)	3
	Bhc (other Than Gamma Isomer)	3
	Bromacil	10
	Butachlor	10
	Carbaryl	8
	Carbofuran	8
	Carbon Disulfide	1
	Chlordane	3
	Chlorobenzilate	1
	Chloromethane (methyl chloride)	3
	Chloroneb	1
	Chlorothalonil	3
	Dacthal Acid Breakdown products	12
	Dalapon	11
	DBCP	5
	DDD	3
	DDE	3
	DDT	3
	Diazinon	10
	Dicamba	11
	Dichlorprop, Butoxyethanol Ester	11
	Dieldrin	3
	Dimethoate	10
	Dinoseb	11
	Diquat Dibromide	8
	Endosulfan	3

Endosulfan Sulfate	3
Endothall	9
Endrin	3
Endrin Aldehyde	3
Ethylene Dibromide	5
Heptachlor	3
Heptachlor Epoxide	3
Hexachlorobenzene	3
Lindane (gamma-BHC)	3
Methiocarb	8
Methomyl	8
Methoxychlor	3
Methyl Bromide (bromomethane)	3
Metolachlor	10
Metribuzin	10
Molinate	10
Naphthalene	3
Ortho-Dichlorobenzene	3
Oxamyl	8
Permethrin	1
Permethrin, Other Related	1
Picloram	11
Prometryn	10
Propachlor	10
Propoxur	8
Simazine	11
Thiobencarb	10
Toxaphene	3
Trichlorobenzenes	3
Trifluralin	1
Xylene	3

Modoc	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	2
	1,2,4-Trichlorobenzene	2
	1,2-D + 1,3-D + C-3 Compounds	2
	1,2-Dichloropropane	2
	2,4-D	1
	Atrazine	1
	Benzene (benzol)	2
	Carbofuran	1
	Chloromethane (methyl chloride)	2
	Diquat Dibromide	1
	Glyphosate, Isopropylamine Salt	1
	Methyl Bromide (bromomethane)	2
	Naphthalene	2
	Ortho-Dichlorobenzene	2
	Simazine	1
	Trichlorobenzenes	2
	Xylene	2

Mono	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	2
	1,2,4-Trichlorobenzene	2
	1,2-D + 1,3-D + C-3 Compounds	2
	1,2-Dichloropropane	2
	Benzene (benzol)	2
	Chloromethane (methyl chloride)	2
	Methyl Bromide (bromomethane)	2
	Naphthalene	2
	Ortho-Dichlorobenzene	2
	Trichlorobenzenes	2
	Xylene	2

Napa	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	7
	1,2,4-Trichlorobenzene	6
	1,2-D + 1,3-D + C-3 Compounds	7
	1,2-Dichloropropane	7
	2,4,5-T	8
	2,4,5-Tp (silvex)	8
	2,4-D	8
	3-hydroxycarbofuran	5
	4(2,4-Db), Dimethylamine Salt	4
	Acifluorfen, Sodium Salt	1
	Alachlor	1
	Aldicarb	5
	Aldicarb Sulfone	5
	Aldicarb Sulfoxide	5
	Aldrin	2
	Atrazine	8
	Bentazon, Sodium Salt	8
	Benzene (benzol)	7
	Bromacil	4
	Butachlor	4
	Carbaryl	5
	Carbofuran	8
	Chlordane	2
	Chloromethane (methyl chloride)	7
	Chlorothalonil	2
	Dacthal Acid Breakdown products	1
	Dalapon	8
	DBCP	3
	Diazinon	4
	Dicamba	9
	Dieldrin	2
	Dimethoate	4
	Dinoseb	8
	Diquat Dibromide	8
	Endothall	7
	Endrin	2
	Ethylene Dibromide	3
	Heptachlor	2
	Heptachlor Epoxide	2
	Hexachlorobenzene	2
	Lindane (gamma-BHC)	2
	Methiocarb	1
	Methomyl	5
	Methoxychlor	2
	Methyl Bromide (bromomethane)	7

Metolachlor	4
Metribuzin	4
Molinate	4
Naphthalene	4
Ortho-Dichlorobenzene	7
Oxamyl	8
Picloram	9
Prometryn	4
Propachlor	4
Propoxur	1
Simazine	8
Thiobencarb	4
Toxaphene	2
Trichlorobenzenes	7
Trifluralin	3
Xylene	7

Nevada	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	2
	1,2,4-Trichlorobenzene	2
	1,2-D + 1,3-D + C-3 Compounds	2
	1,2-Dichloropropane	2
	2,3,7,8-TCDD (dioxin)	3
	2,4,5-Tp (silvex)	2
	2,4-D	2
	3-hydroxycarbofuran	2
	Alachlor	2
	Aldicarb	2
	Aldicarb Sulfone	2
	Aldicarb Sulfoxide	2
	Aldrin	2
	Atrazine	2
	Bentazon, Sodium Salt	2
	Benzene (benzol)	2
	Carbaryl	2
	Carbofuran	2
	Chlordane	2
	Chloromethane (methyl chloride)	2
	Dacthal Acid Breakdown products	2
	Dalapon	2
	DBCP	2
	Dicamba	2
	Dieldrin	2
	Dinoseb	2
	Diquat Dibromide	2
	Endothall	2
	Endrin	2
	Ethylene Dibromide	2
	Glyphosate, Isopropylamine Salt	2
	Heptachlor	2
	Heptachlor Epoxide	2
	Hexachlorobenzene	2
	Lindane (gamma-BHC)	2
	Methomyl	2
	Methoxychlor	2
	Methyl Bromide (bromomethane)	2
	Molinate	2
	Naphthalene	2
	Ortho-Dichlorobenzene	2
	Oxamyl	2
	Picloram	2
	Simazine	2
	Thiobencarb	2

Toxaphene	2
Trichlorobenzenes	2
Xylene	2

Placer	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	10
	1,2,4-Trichlorobenzene	10
	1,2-D + 1,3-D + C-3 Compounds	10
	1,2-Dichloropropane	10
	2,4,5-T	2
	2,4,5-Tp (silvex)	2
	2,4-D	2
	3-hydroxycarbofuran	5
	4(2,4-Db), Dimethylamine Salt	1
	Alachlor	2
	Aldicarb	5
	Aldicarb Sulfone	5
	Aldicarb Sulfoxide	5
	Aldrin	2
	Atrazine	5
	Bentazon, Sodium Salt	2
	Benzene (benzol)	10
	Bromacil	5
	Butachlor	5
	Carbaryl	5
	Carbofuran	5
	Chlordane	2
	Chloromethane (methyl chloride)	10
	Chlorothalonil	2
	Dalapon	2
	DBCP	2
	Diazinon	5
	Dicamba	2
	Dieldrin	2
	Dimethoate	5
	Dinoseb	2
	Diquat Dibromide	2
	Diuron	1
	Endothall	2
	Endrin	2
	Ethylene Dibromide	2
	Glyphosate, Isopropylamine Salt	2
	Heptachlor	2
	Heptachlor Epoxide	2
	Hexachlorobenzene	2
	Lindane (gamma-BHC)	2
	Methiocarb	1
	Methomyl	5
	Methoxychlor	2
	Methyl Bromide (bromomethane)	10

Metolachlor	5
Metribuzin	5
Molinate	5
Naphthalene	10
Ortho-Dichlorobenzene	10
Oxamyl	5
Picloram	2
Prometryn	5
Propachlor	5
Propoxur	1
Simazine	5
Thiobencarb	5
Toxaphene	2
Trichlorobenzenes	10
Trifluralin	4
Xylene	10

Plumas	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	11
	1,2,4-Trichlorobenzene	11
	1,2-D + 1,3-D + C-3 Compounds	11
	1,2-Dichloropropane	11
	Benzene (benzol)	11
	Chloromethane (methyl chloride)	11
	Methyl Bromide (bromomethane)	11
	Naphthalene	11
	Ortho-Dichlorobenzene	11
	Trichlorobenzenes	11
	Xylene	11

San Benito	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	1
	1,2,4-Trichlorobenzene	1
	1,2-D + 1,3-D + C-3 Compounds	1
	1,2-Dichloropropane	1
	2,4,5-T	5
	2,4,5-Tp (silvex)	5
	2,4-D	5
	3-hydroxycarbofuran	4
	Alachlor	4
	Aldicarb	4
	Aldicarb Sulfone	4
	Aldicarb Sulfoxide	4
	Atrazine	4
	Bentazon, Sodium Salt	5
	Benzene (benzol)	1
	Bromacil	4
	Butachlor	4
	Carbaryl	4
	Carbofuran	4
	Chloromethane (methyl chloride)	1
	Dalapon	5
	Diazinon	1
	Dicamba	5
	Dimethoate	4
	Dinoseb	5
	Diquat Dibromide	6
	Methomyl	4
	Methyl Bromide (bromomethane)	1
	Metolachlor	4
	Metribuzin	4
	Molinate	4
	Naphthalene	1
	Ortho-Dichlorobenzene	1
	Oxamyl	4
	Picloram	5
	Prometryn	4
	Propachlor	4
	Simazine	4
	Thiobencarb	4
	Trichlorobenzenes	1
	Xylene	1

Santa Barbara	Chemical	Wells Sampled
	1,3-Dichloropropene (1,3-D Telone)	10
	1,1,2,2-Tetrachloroethane	27
	1,2,4-Trichlorobenzene	28
	1,2-D + 1,3-D + C-3 Compounds	11
	1,2-Dichloropropane	27
	2,3,7,8-TCDD (dioxin)	1
	2,4,5-T	1
	2,4,5-Tp (silvex)	7
	2,4-D	7
	3-hydroxycarbofuran	8
	Alachlor	12
	Aldicarb	8
	Aldicarb Sulfone	8
	Aldicarb Sulfoxide	8
	Aldrin	8
	Atrazine	26
	Bentazon, Sodium Salt	7
	Benzene (benzol)	32
	Bromacil	11
	Butachlor	11
	Carbaryl	8
	Carbofuran	8
	Chlordane	9
	Chloromethane (methyl chloride)	11
	Chlorothalonil	7
	Dacthal Acid Breakdown products	6
	Dalapon	7
	DBCP	21
	Diazinon	11
	Dicamba	7
	Dieldrin	8
	Dimethoate	11
	Dinoseb	7
	Diquat Dibromide	7
	Diuron	1
	Endothall	1
	Endrin	10
	Ethylene Dibromide	21
	Glyphosate, Isopropylamine Salt	1
	Heptachlor	9
	Heptachlor Epoxide	9
	Hexachlorobenzene	8
	Lindane (gamma-BHC)	8
	Methomyl	8
	Methoxychlor	9

Methyl Bromide (bromomethane)	11
Metolachlor	11
Metribuzin	11
Molinate	12
Naphthalene	11
Ortho-Dichlorobenzene	27
Oxamyl	9
Picloram	7
Prometryn	11
Propachlor	9
Simazine	26
Thiobencarb	12
Toxaphene	8
Trichlorobenzenes	11
Xylene	31

Santa Cruz	Chemical	Wells Sampled
	1,3-Dichloropropene (1,3-D Telone)	1
	1,1,2,2-Tetrachloroethane	19
	1,2,4-Trichlorobenzene	19
	1,2-D + 1,3-D + C-3 Compounds	19
	1,2-Dichloropropane	19
	2,3,7,8-TCDD (dioxin)	10
	2,4,5-T	4
	2,4,5-Tp (silvex)	14
	2,4-D	14
	3-hydroxycarbofuran	13
	Alachlor	14
	Aldicarb	13
	Aldicarb Sulfone	13
	Aldicarb Sulfoxide	13
	Aldrin	12
	Atrazine	14
	Bentazon, Sodium Salt	14
	Benzene (benzol)	19
	Bromacil	14
	Butachlor	14
	Carbaryl	13
	Carbofuran	13
	Carbon Disulfide	4
	Chlordane	12
	Chloromethane (methyl chloride)	19
	Chlorothalonil	2
	Dalapon	14
	DBCP	12
	Diazinon	12
	Dicamba	14
	Dieldrin	12
	Dimethoate	14
	Dinoseb	14
	Diquat Dibromide	17
	Endothall	13
	Endrin	12
	Ethylene Dibromide	12
	Glyphosate, Isopropylamine Salt	12
	Heptachlor	12
	Heptachlor Epoxide	12
	Hexachlorobenzene	12
	Lindane (gamma-BHC)	12
	Methomyl	13
	Methoxychlor	12
	Methyl Bromide (bromomethane)	19

Metolachlor	14
Metribuzin	14
Molinate	14
Naphthalene	19
Ortho-Dichlorobenzene	19
Oxamyl	13
Picloram	14
Prometryn	14
Propachlor	14
Simazine	14
Thiobencarb	14
Toxaphene	12
Trichlorobenzenes	19
Xylene	19

Shasta	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	17
	1,2,4-Trichlorobenzene	4
	1,2-D + 1,3-D + C-3 Compounds	17
	1,2-Dichloropropane	17
	Alachlor	1
	Atrazine	1
	Benzene (benzol)	17
	Chloromethane (methyl chloride)	17
	DBCP	1
	Ethylene Dibromide	1
	Methyl Bromide (bromomethane)	17
	Naphthalene	4
	Ortho-Dichlorobenzene	17
	Simazine	1
	Trichlorobenzenes	17
	Xylene	17

Siskiyou	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	2
	1,2,4-Trichlorobenzene	2
	1,2-D + 1,3-D + C-3 Compounds	2
	1,2-Dichloropropane	2
	2,3,7,8-TCDD (dioxin)	1
	2,4,5-Tp (silvex)	1
	2,4-D	1
	Alachlor	1
	Atrazine	1
	Bentazon, Sodium Salt	1
	Benzene (benzol)	2
	Carbofuran	1
	Chlordane	1
	Chloromethane (methyl chloride)	2
	Dalapon	1
	DBCP	1
	Dinoseb	1
	Diquat Dibromide	1
	Endothall	1
	Endrin	1
	Ethylene Dibromide	1
	Glyphosate, Isopropylamine Salt	1
	Heptachlor	1
	Heptachlor Epoxide	1
	Hexachlorobenzene	1
	Lindane (gamma-BHC)	1
	Methoxychlor	1
	Methyl Bromide (bromomethane)	2
	Molinate	1
	Naphthalene	2
	Ortho-Dichlorobenzene	2
	Oxamyl	1
	Picloram	1
	Simazine	1
	Thiobencarb	1
	Toxaphene	1
	Trichlorobenzenes	2
	Xylene	2

Solano	Chemical	Wells Sampled
	1,3-Dichloropropene (1,3-D Telone)	4
	1,1,2,2-Tetrachloroethane	16
	1,2,4-Trichlorobenzene	16
	1,2-D + 1,3-D + C-3 Compounds	16
	1,2-Dichloropropane	16
	2,4,5-T	3
	2,4,5-Tp (silvex)	3
	2,4-D	3
	Alachlor	4
	Aldrin	4
	Atrazine	4
	Bentazon, Sodium Salt	3
	Benzene (benzol)	16
	Bromacil	4
	Butachlor	4
	Chlordane	4
	Chloromethane (methyl chloride)	13
	Chlorothalonil	1
	Dalapon	3
	DBCP	4
	Diazinon	4
	Dicamba	3
	Dieldrin	4
	Dimethoate	4
	Dinoseb	3
	Diquat Dibromide	3
	Endothall	3
	Endrin	4
	Ethylene Dibromide	4
	Heptachlor	4
	Heptachlor Epoxide	4
	Hexachlorobenzene	4
	Lindane (gamma-BHC)	4
	Methoxychlor	4
	Methyl Bromide (bromomethane)	13
	Metolachlor	4
	Metribuzin	4
	Molinate	4
	Naphthalene	15
	Ortho-Dichlorobenzene	16
	Picloram	3
	Prometryn	4
	Propachlor	4
	Simazine	4
	Thiobencarb	4

Toxaphene	4
Trichlorobenzenes	16
Trifluralin	1
Xylene	16

Sutter	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	2
	1,2,4-Trichlorobenzene	2
	1,2-D + 1,3-D + C-3 Compounds	2
	1,2-Dichloropropane	2
	Benzene (benzol)	2
	Chloromethane (methyl chloride)	2
	DBCP	1
	Ethylene Dibromide	1
	Methyl Bromide (bromomethane)	2
	Naphthalene	2
	Ortho-Dichlorobenzene	2
	Trichlorobenzenes	2
	Xylene	2

Tehama	Chemical	Wells Sampled
	Acetochlor	11
	Dacthal Acid Breakdown products	11
	DDE	11
	EPTC	11
	Molinate	11
	Terbacil	11

Tuolumne	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	24
	1,2,4-Trichlorobenzene	20
	1,2-D + 1,3-D + C-3 Compounds	24
	1,2-Dichloropropane	24
	Alachlor	14
	Atrazine	23
	Benzene (benzol)	24
	Bromacil	14
	Butachlor	14
	Carbon Disulfide	3
	Chloromethane (methyl chloride)	24
	DBCP	3
	Dimethoate	14
	Methyl Bromide (bromomethane)	24
	Metolachlor	14
	Metribuzin	14
	Molinate	14
	Naphthalene	14
	Ortho-Dichlorobenzene	24
	Prometryn	14
	Propachlor	14
	Simazine	23
	Thiobencarb	14
	Trichlorobenzenes	24
	Xylene	24

Yolo	Chemical	Wells Sampled
	1,1,2,2-Tetrachloroethane	26
	1,2,4-Trichlorobenzene	26
	1,2-D + 1,3-D + C-3 Compounds	26
	1,2-Dichloropropane	26
	2,3,7,8-TCDD (dioxin)	5
	2,4,5-T	3
	2,4,5-Tp (silvex)	5
	2,4-D	5
	3-hydroxycarbofuran	4
	Acetochlor	4
	Alachlor	7
	Aldicarb	7
	Aldicarb Sulfone	7
	Aldicarb Sulfoxide	7
	Aldrin	4
	Ametryne	1
	Aminocarb	1
	Atrazine	7
	Barban	1
	Bentazon, Sodium Salt	5
	Benzene (benzol)	26
	Bromacil	3
	Butachlor	4
	Butylate	1
	Carbaryl	7
	Carbofuran	7
	Chlordane	7
	Chloromethane (methyl chloride)	26
	Chloroneb	1
	Chlorothalonil	3
	Chlorpropham	2
	Chlorpyrifos	1
	Dacthal Acid Breakdown products	6
	Cycloate	1
	Dalapon	5
	DBCP	17
	DDE	4
	Diazinon	3
	Dicamba	5
	Dieldrin	3
	Dimethoate	3
	Dinoseb	5
	Diphenamid	1
	Diquat Dibromide	7
	Diuron	2

Endothall	6
Endrin	7
EPTC	4
Ethylene Dibromide	17
Fenuron	1
Fenuron Trichloroacetate (tca)	1
Fluometuron	1
Glyphosate, Isopropylamine Salt	6
Heptachlor	7
Heptachlor Epoxide	7
Hexachlorobenzene	7
Lindane (gamma-BHC)	7
Linuron	1
Methiocarb	2
Methomyl	7
Methoxychlor	7
Methyl Bromide (bromomethane)	26
Metolachlor	4
Metribuzin	4
Mexacarbate	1
Molinate	11
Monuron	1
Monuron-Tca	1
Naphthalene	25
Napropamide	1
Neburon	1
Ortho-Dichlorobenzene	26
Oxamyl	7
Paraquat Dichloride	1
Permethrin	1
Picloram	5
Prometryn	4
Propachlor	4
Propazine	1
Propham	1
Propoxur	2
Siduron	1
Simazine	7
Simetryn	1
Terbacil	4
Terbutryn	1
Thiobencarb	7
Toxaphene	7
Triadimefon	1
Trichlorobenzenes	26
Trifluralin	1
Vernolate	1
Xylene	26

Butte	Chemical	Wells Sampled	Wells with Detections
	1,1,2,2-Tetrachloroethane	52	
	1,2,4-Trichlorobenzene	52	
	1,2-D+ 1,3-D + C-3 Compounds	52	
	1,2-Dichloropropane	52	
	Acetochlor	1	
	Alachlor	11	
	Atrazine	11	
	Benzene (benzol)	52	
	Bromacil	11	
	Butachlor	11	
	Chloromethane (methyl chloride)	40	
	Dacthal Acid Breakdown products	5	2
	DBCP	1	
	DDE	1	
	Diazinon	1	
	Dimethoate	11	
	EPTC	1	
	Ethylene Dibromide	1	
	Glyphosate, Isopropylamine Salt	5	
	Methyl Bromide (bromomethane)	40	
	(s)-metolachlor	11	
	Metribuzin	11	
	Molinate	12	
	Naphthalene	51	
	Ortho-Dichlorobenzene	52	
	Prometryn	9	
	Propachlor	11	
	Simazine	11	
	Terbacil	1	
	Thiobencarb	11	
	Trichlorobenzenes	52	
	Xylene	52	

Contra Costa	Chemical	Wells Sampled	Wells with Detections
	1,3-Dichloropropene (1,3-D Telone)	8	
	1,1,2,2-Tetrachloroethane	27	
	1,2,4-Trichlorobenzene	27	
	1,2-D+ 1,3-D + C-3 Compounds	27	
	1,2-Dichloropropane	27	
	2,3,7,8-TCDD (dioxin)	2	
	2,4,5-T	3	
	2,4,5-TP (silvex)	7	
	2,4-D	7	
	3-hydroxycarbofuran	6	
	Alachlor	7	
	Aldicarb	6	
	Aldicarb Sulfone	6	
	Aldicarb Sulfoxide	6	
	Aldrin	7	
	Atrazine	7	
	Bentazon, Sodium Salt	7	
	Benzene (benzol)	27	
	Bromacil	7	
	Butachlor	7	
	Carbaryl	6	
	Carbofuran	6	
	Carbon Disulfide	17	
	Chlordane	7	
	Chloromethane (methyl chloride)	27	
	Chlorothalonil	2	
	Dalapon	7	
	DBCP	7	1
	Diazinon	7	
	Dicamba	3	
	Dieldrin	7	
	Dimethoate	7	
	Dinoseb	7	
	Diquat Dibromide	6	
	Diuron	6	
	Endothall	6	
	Endrin	7	
	Ethylene Dibromide	7	
	Glyphosate, Isopropylamine Salt	6	
	Heptachlor	7	
	Heptachlor Epoxide	7	
	Hexachlorobenzene	7	
	Lindane (gamma-BHC)	7	
	Methomyl	6	
	Methoxychlor	7	

Methyl Bromide (bromomethane)	27
Metolachlor	7
Metribuzin	7
Molinate	7
Naphthalene	27
Ortho-Dichlorobenzene	27
Oxamyl	6
Picloram	7
Prometryn	7
Propachlor	7
Simazine	7
Thiobencarb	8
Toxaphene	7
Trichlorobenzenes	27
Xylene	23

Del Norte	Chemical	Wells Sampled	Wells with Detections
	1,1,2,2-Tetrachloroethane	2	
	1,2,4-Trichlorobenzene	2	
	1,2-D+ 1,3-D + C-3 Compounds	2	
	1,2-Dichloropropane	2	
	Benzene (benzol)	2	
	Chloromethane (methyl chloride)	2	
	Methyl Bromide (bromomethane)	2	
	Naphthalene	2	
	Ortho-Dichlorobenzene	2	
	Trichlorobenzenes	2	
	Xylene	2	1

Fresno	Chemical	Wells Sampled	Wells with Detections
	1,3-Dichloropropene (1,3-D Telone)	6	
	1,1,2,2-Tetrachloroethane	286	
	1,2,4-Trichlorobenzene	280	
	1,2-D+ 1,3-D + C-3 Compounds	286	
	1,2-Dichloropropane	280	1
	2,4,5-T	9	
	2,4,5-TP (silvex)	9	
	2,4-D	9	
	3-hydroxycarbofuran	13	
	ACET	50	49
	Acetochlor	3	
	Alachlor	243	
	Aldicarb	13	
	Aldicarb Sulfone	13	
	Aldicarb Sulfoxide	13	
	Aldrin	9	
	Atrazine	298	2
	Bentazon, Sodium Salt	9	
	Benzene (benzol)	286	
	Bromacil	282	17
	Butachlor	232	
	Carbaryl	13	
	Carbofuran	13	
	Chlordane	19	
	Chloromethane (methyl chloride)	284	
	Chlorothalonil	8	
	Dacthal Acid Breakdown products	3	
	Dalapon	9	
	DBCP	297	110
	DDE	3	
	Deethyl-atrazine	50	6
	Demethylnorflurazon	48	21
	Diaminochlorotriazine (DACT)	50	46
	Diazinon	23	1
	Dicamba	9	
	Dieldrin	9	
	Dimethoate	232	
	Dinoseb	9	
	Diquat Dibromide	1	
	Diuron	50	32
	Endothall	1	
	Endrin	19	
	EPTC	3	
	Ethylene Dibromide	281	3
	Glyphosate, Isopropylamine Salt	1	

Heptachlor	19	
Heptachlor Epoxide	19	
Hexachlorobenzene	19	
Hexazinone	50	1
Lindane (gamma-BHC)	19	
Methomyl	13	
Methoxychlor	19	
Methyl Bromide (bromomethane)	284	
Metolachlor	238	
Metribuzin	238	
Molinate	241	
Naphthalene	280	
Norflurazon	50	14
Ortho-Dichlorobenzene	286	
Oxamyl	13	
Picloram	9	
Prometon	50	1
Prometryn	232	
Propachlor	232	
Simazine	298	48
Terbacil	3	
Thiobencarb	239	
Toxaphene	19	
Trichlorobenzenes	286	
Trifluralin	1	
Xylene	286	

Inyo	Chemical	Wells Sampled	Wells with Detections
	1,3-Dichloropropene (1,3-D Telone)	2	
	1,1,2,2-Tetrachloroethane	4	
	1,2,4-Trichlorobenzene	4	
	1,2-D+ 1,3-D + C-3 Compounds	4	
	1,2-Dichloropropane	4	
	2,4,5-T	1	
	2,4,5-TP (silvex)	1	
	2,4-D	1	
	3-hydroxycarbofuran	1	
	Alachlor	1	
	Aldicarb	1	
	Aldicarb Sulfone	1	
	Aldicarb Sulfoxide	1	
	Aldrin	1	
	Atrazine	1	
	Bentazon, Sodium Salt	1	
	Benzene (benzol)	4	
	Bromacil	1	
	Butachlor	1	
	Carbaryl	1	
	Carbofuran	1	
	Chlordane	1	
	Chloromethane (methyl chloride)	4	
	Chlorothalonil	1	
	Dalapon	1	
	DBCP	1	1
	Diazinon	1	
	Dicamba	1	
	Dieldrin	1	
	Dimethoate	1	
	Dinoseb	1	
	Diquat Dibromide	1	
	Diuron	1	
	Endothall	1	
	Endrin	1	
	Ethylene Dibromide	1	
	Glyphosate, Isopropylamine Salt	1	
	Heptachlor	1	
	Heptachlor Epoxide	1	
	Hexachlorobenzene	1	
	Lindane (gamma-BHC)	1	
	Methomyl	1	
	Methoxychlor	1	
	Methyl Bromide (bromomethane)	4	
	Metolachlor	1	

Metribuzin	1
Molinate	1
Naphthalene	4
Ortho-Dichlorobenzene	4
Oxamyl	1
Picloram	1
Prometryn	1
Propachlor	1
Simazine	1
Thiobencarb	1
Toxaphene	1
Trichlorobenzenes	4
Xylene	4

Kern	Chemical	Wells Sampled	Wells with Detections
	1,3-Dichloropropene (1,3-D Telone)	10	
	1,1,2,2-Tetrachloroethane	194	
	1,2,4-Trichlorobenzene	195	
	1,2-D+ 1,3-D + C-3 Compounds	184	
	1,2-Dichloropropane	194	3
	2,3,7,8-TCDD (dioxin)	9	
	2,4,5-T	16	
	2,4,5-TP (silvex)	30	
	2,4-D	30	
	3-hydroxycarbofuran	23	
	4(2,4-DB), Dimethylamine Salt	1	
	Acetochlor	3	
	Acifluorfen, Sodium Salt	1	
	Alachlor	146	
	Aldicarb	25	
	Aldicarb Sulfone	24	
	Aldicarb Sulfoxide	24	
	Aldrin	21	
	Atraton	11	
	Atrazine	149	
	Benefin (benfluralin)	1	
	Bentazon, Sodium Salt	30	
	Benzene (benzol)	195	1
	Bhc (other Than Gamma Isomer)	11	
	Bromacil	123	
	Butachlor	112	
	Carbaryl	24	
	Carbofuran	24	
	Chlordane	21	
	Chloromethane (methyl chloride)	158	
	Chlorothalonil	20	
	Dacthal Acid Breakdown products	10	1
	Dalapon	30	
	DBCP	88	18
	DDD	1	
	DDE	4	
	DDT	1	
	Diazinon	33	
	Dicamba	30	
	Dichlorprop, Butoxyethanol Ester	2	
	Dieldrin	21	
	Dimethoate	123	
	Dinoseb	30	
	Diquat Dibromide	11	
	Diuron	1	

Endothall	11	
Endrin	24	
EPTC	3	
Ethylene Dibromide	86	5
Glyphosate, Isopropylamine Salt	11	
Heptachlor	24	
Heptachlor Epoxide	24	
Hexachlorobenzene	32	
Lindane (gamma-BHC)	32	
MCPA, Dimethylamine Salt	1	
MCPP (2-(4-chloro-2-methylphenoxy)propionic Acid)	1	
Methomyl	24	
Methoxychlor	32	
Methyl Bromide (bromomethane)	158	
Metolachlor	123	
Metribuzin	123	
Molinate	123	
Naphthalene	183	
Ortho-Dichlorobenzene	194	
Oxamyl	24	
Pendimethalin	1	
Pentachloronitrobenzene (PCNB)	1	
Picloram	24	
Prometon	11	
Prometryn	120	
Propachlor	110	
Secbumeton	11	
Simazine	150	
Terbacil	3	
Terbutryn	11	
Thiobencarb	123	
Toxaphene	24	
Trichlorobenzenes	184	
Xylene	195	

Kings	Chemical	Wells Sampled	Wells with Detections
	1,1,2,2-Tetrachloroethane	30	
	1,2,4-Trichlorobenzene	30	
	1,2-D+ 1,3-D + C-3 Compounds	30	
	1,2-Dichloropropane	30	
	2,4,5-T	1	
	2,4,5-TP (silvex)	1	
	2,4-D	1	
	3-hydroxycarbofuran	1	
	Alachlor	5	
	Aldicarb	1	
	Aldicarb Sulfone	1	
	Aldicarb Sulfoxide	1	
	Aldrin	1	
	Atrazine	5	
	Bentazon, Sodium Salt	1	
	Benzene (benzol)	32	2
	Bromacil	5	
	Butachlor	5	
	Carbaryl	1	
	Carbofuran	1	
	Chlordane	1	
	Chloromethane (methyl chloride)	30	
	Chlorothalonil	1	
	Dalapon	1	
	DBCP	3	
	Diazinon	1	
	Dicamba	1	
	Dieldrin	1	
	Dimethoate	5	
	Dinoseb	1	
	Endrin	1	
	Ethylene Dibromide	3	
	Heptachlor	1	
	Heptachlor Epoxide	1	
	Hexachlorobenzene	1	
	Lindane (gamma-BHC)	1	
	Methomyl	1	
	Methoxychlor	1	
	Methyl Bromide (bromomethane)	30	
	Metolachlor	5	
	Metribuzin	5	
	Molinate	5	
	Naphthalene	30	
	Ortho-Dichlorobenzene	30	
	Oxamyl	1	

Picloram	1
Prometryn	5
Propachlor	5
Simazine	5
Thiobencarb	5
Toxaphene	1
Trichlorobenzenes	30
Xylene	30

Los Angeles	Chemical	Wells Sampled	Wells with Detections
	1,3-Dichloropropene (1,3-D Telone)	257	
	1,1,2,2-Tetrachloroethane	709	
	1,2,4-Trichlorobenzene	712	
	1,2-D+ 1,3-D + C-3 Compounds	633	
	1,2-Dichloropropane	713	1
	2,3,7,8-TCDD (dioxin)	73	
	2,4,5-T	23	
	2,4,5-TP (silvex)	75	
	2,4-D	75	
	3-hydroxycarbofuran	60	
	4(2,4-DB), Dimethylamine Salt	15	
	Acenaphthene	16	
	Acetochlor	24	
	Acifluorfen, Sodium Salt	16	
	Alachlor	103	
	Aldicarb	66	
	Aldicarb Sulfone	66	
	Aldicarb Sulfoxide	66	
	Aldrin	72	
	Atrazine	158	
	Bentazon, Sodium Salt	75	
	Benzene (benzol)	713	
	Bhc (other Than Gamma Isomer)	3	
	Bromacil	86	
	Butachlor	85	
	Captan	2	
	Carbaryl	61	
	Carbofuran	66	
	Carbon Disulfide	25	
	Chlordane	79	
	Chloromethane (methyl chloride)	627	6
	Chlorothalonil	43	
	Chlorthal-Dimethyl	13	
	Dacthal Acid Breakdown products	38	
	Coumaphos	2	
	Dalapon	75	
	DBCP	136	1
	DDD	3	
	DDE	29	
	DDT	18	
	Demeton	2	
	Diazinon	67	
	Dicamba	69	
	Dichlorprop, Butoxyethanol Ester	15	
	Dieldrin	72	

Dimethoate	71	
Dinoseb	75	
Diphenamid	2	
Diquat Dibromide	74	
Disulfoton	2	
Diuron	14	
Endosulfan	3	
Endosulfan Sulfate	3	
Endothall	74	
Endrin	80	
Endrin Aldehyde	3	
EPN	2	
EPTC	26	
Ethion	2	
Ethylene Dibromide	136	1
Fensulfothion	2	
Fenthion	2	
Glyphosate, Isopropylamine Salt	76	
Heptachlor	80	
Heptachlor Epoxide	80	
Hexachlorobenzene	80	
Lindane (gamma-BHC)	80	
Malathion	3	
Merphos	2	
Methiocarb	17	
Methomyl	60	
Methoxychlor	80	
Methyl Bromide (bromomethane)	627	1
Methyl Parathion	1	
Metolachlor	85	
Metribuzin	85	
Molinate	124	
Naled	2	
Naphthalene	337	
Ortho-Dichlorobenzene	713	
Oxamyl	66	
Paraquat Dichloride	4	
Parathion Or Ethyl Parathion	1	
Pentachloronitrobenzene (PCNB)	2	
Phorate	2	
Picloram	75	
Prometon	2	
Prometryn	70	
Propachlor	82	
Propazine	16	
Propoxur	4	
Ronnel	2	
Simazine	158	

Terbacil	27
Tetrachlorvinphos (stirofos)	2
Thiobencarb	199
Toxaphene	80
Trichlorobenzenes	633
Trichloronate	2
Trifluralin	18
Xylene	534

Madera	Chemical	Wells Sampled	Wells with Detections
	1,1,2,2-Tetrachloroethane	31	
	1,2,4-Trichlorobenzene	30	
	1,2-D+ 1,3-D + C-3 Compounds	31	
	1,2-Dichloropropane	30	
	3-hydroxycarbofuran	2	
	Alachlor	17	
	Aldicarb	2	
	Aldicarb Sulfone	2	
	Aldicarb Sulfoxide	2	
	Atrazine	18	
	Benzene (benzol)	31	1
	Bromacil	15	
	Butachlor	15	
	Carbaryl	2	
	Carbofuran	2	
	Chlordane	2	
	Chloromethane (methyl chloride)	31	
	DBCP	33	3
	Diazinon	1	
	Dimethoate	15	
	Endrin	2	
	Ethylene Dibromide	32	1
	Heptachlor	2	
	Heptachlor Epoxide	2	
	Hexachlorobenzene	2	
	Lindane (gamma-BHC)	2	
	Methiocarb	1	
	Methomyl	2	
	Methoxychlor	2	
	Methyl Bromide (bromomethane)	31	
	Metolachlor	15	
	Metribuzin	15	
	Molinate	15	
	Naphthalene	30	
	Ortho-Dichlorobenzene	31	
	Oxamyl	2	
	Prometryn	15	
	Propachlor	14	
	Propoxur	1	
	Simazine	18	
	Thiobencarb	15	
	Toxaphene	2	
	Trichlorobenzenes	31	
	Xylene	31	1

Merced	Chemical	Wells Sampled	Wells with Detections
	1,1,2,2-Tetrachloroethane	28	
	1,2,4-Trichlorobenzene	28	
	1,2-D+ 1,3-D + C-3 Compounds	28	
	1,2-Dichloropropane	28	
	2,4,5-T	2	
	2,4,5-TP (silvex)	4	
	2,4-D	3	
	3-hydroxycarbofuran	3	
	Alachlor	16	
	Aldicarb	3	
	Aldicarb Sulfone	3	
	Aldicarb Sulfoxide	3	
	Aldrin	4	
	Atrazine	16	
	Bentazon, Sodium Salt	3	
	Benzene (benzol)	28	
	Bromacil	16	
	Butachlor	16	
	Carbaryl	3	
	Carbofuran	3	
	Chlordane	3	
	Chloromethane (methyl chloride)	28	
	Chlorothalonil	3	
	Dalapon	3	
	DBCP	30	14
	Diazinon	16	
	Dicamba	3	
	Dieldrin	3	
	Dimethoate	15	
	Dinoseb	3	
	Diquat Dibromide	2	
	Diuron	2	
	Endothall	2	
	Endrin	3	
	Ethylene Dibromide	28	2
	Glyphosate, Isopropylamine Salt	3	
	Heptachlor	3	
	Heptachlor Epoxide	3	
	Hexachlorobenzene	3	
	Lindane (gamma-BHC)	3	
	Methomyl	4	
	Methoxychlor	3	
	Methyl Bromide (bromomethane)	28	
	Metolachlor	16	
	Metribuzin	16	
	Molinate	16	

Naphthalene	28
Ortho-Dichlorobenzene	28
Oxamyl	3
Picloram	3
Prometryn	16
Propachlor	15
Simazine	16
Thiobencarb	16
Toxaphene	3
Trichlorobenzenes	28
Xylene	28

Monterey	Chemical	Wells Sampled	Wells with Detections
	1,3-Dichloropropene (1,3-D Telone)	25	
	1,1,2,2-Tetrachloroethane	83	
	1,2,4-Trichlorobenzene	83	
	1,2-D+ 1,3-D + C-3 Compounds	83	
	1,2-Dichloropropane	83	
	2,3,7,8-TCDD (dioxin)	8	
	2,4,5-T	54	
	2,4,5-TP (silvex)	61	
	2,4-D	65	
	3-hydroxycarbofuran	62	
	4(2,4-DB), Dimethylamine Salt	2	
	Acenaphthene	2	
	Acetochlor	2	
	Acifluorfen, Sodium Salt	2	
	Alachlor	47	
	Aldicarb	62	
	Aldicarb Sulfone	62	
	Aldicarb Sulfoxide	62	
	Aldrin	18	
	Atrazine	51	
	Bentazon, Sodium Salt	61	
	Benzene (benzol)	83	
	Bromacil	40	
	Butachlor	40	
	Carbaryl	62	
	Carbofuran	62	
	Carbon Disulfide	25	
	Chlordane	18	
	Chloromethane (methyl chloride)	78	
	Chlorothalonil	9	
	Dacthal Acid Breakdown products	8	2
	Dalapon	61	
	DBCP	19	
	DDE	3	
	DDT	2	
	Diazinon	15	
	Dicamba	61	
	Dichlorprop, Butoxyethanol Ester	2	
	Dieldrin	18	
	Dimethoate	38	
	Dinoseb	61	
	Diquat Dibromide	65	
	Diuron	5	
	Endothall	19	
	Endrin	18	

EPTC	3	
Ethylene Dibromide	20	
Glyphosate, Isopropylamine Salt	20	
Heptachlor	18	
Heptachlor Epoxide	18	
Hexachlorobenzene	18	
Lindane (gamma-BHC)	18	
Methiocarb	9	
Methomyl	62	
Methoxychlor	18	
Methyl Bromide (bromomethane)	78	
Metolachlor	40	
Metribuzin	40	
Molinate	47	
Naphthalene	83	
Ortho-Dichlorobenzene	83	
Oxamyl	62	
Picloram	61	
Prometryn	38	
Propachlor	40	
Propazine	2	
Propoxur	7	
Simazine	51	
Terbacil	2	
Thiobencarb	47	
Toxaphene	18	
Trichlorobenzenes	83	
Trifluralin	2	
Xylene	83	1

Orange	Chemical	Wells Sampled	Wells with Detections
	1,3-Dichloropropene (1,3-D Telone)	219	
	1,1,2,2-Tetrachloroethane	226	
	1,2,4-Trichlorobenzene	226	
	1,2-D+ 1,3-D + C-3 Compounds	222	
	1,2-Dichloropropane	226	
	2,3,7,8-TCDD (dioxin)	2	
	2,4,5-TP (silvex)	29	
	2,4,6-Trichlorophenol	16	
	2,4-D	29	
	2,4-Dinitrophenol	3	
	3-hydroxycarbofuran	18	
	Acenaphthene	17	
	Acetochlor	39	
	Alachlor	156	
	Aldicarb	18	
	Aldicarb Sulfone	18	
	Aldicarb Sulfoxide	18	
	Aldrin	30	
	Atrazine	156	
	Bentazon, Sodium Salt	29	
	Benzene (benzol)	226	
	Bhc (other Than Gamma Isomer)	29	
	Bromacil	156	
	Butachlor	156	
	Carbaryl	18	
	Carbofuran	18	
	Chlordane	18	
	Chloromethane (methyl chloride)	222	
	Chlorothalonil	30	
	Chlorthal-Dimethyl	2	
	Dacthal Acid Breakdown products	2	
	Dalapon	29	
	DBCP	219	
	DDD	29	
	DDE	31	
	DDT	29	
	Diazinon	160	
	Dicamba	28	
	Dieldrin	30	
	Dimethoate	156	
	Dinoseb	29	
	Diquat Dibromide	143	
	Disulfoton	16	
	Diuron	17	
	Endosulfan	29	

Endosulfan Sulfate	29	
Endothall	150	
Endrin	31	
Endrin Aldehyde	29	
EPTC	2	
Ethylene Dibromide	219	
Fonofos (dyfonate)	16	
Glyphosate, Isopropylamine Salt	26	
Heptachlor	31	
Heptachlor Epoxide	31	
Hexachlorobenzene	31	
Lindane (gamma-BHC)	29	
Linuron	5	
Malathion	153	
Methiocarb	16	
Methomyl	18	
Methoxychlor	31	
Methyl Bromide (bromomethane)	222	
Methyl Parathion	153	
Metolachlor	156	
Metribuzin	156	
Molinate	159	
Naphthalene	221	
Ortho-Dichlorobenzene	226	
Oxamyl	18	
Paraquat Dichloride	141	
Parathion Or Ethyl Parathion	153	
Picloram	29	
Prometon	157	
Prometryn	156	
Propachlor	154	
Propoxur	16	
Simazine	156	1
Terbacil	4	
Thiobencarb	158	
Toxaphene	18	
Trichlorobenzenes	222	
Xylene	224	1

Riverside	Chemical	Wells Sampled	Wells with Detections
	1,1,2,2-Tetrachloroethane	143	
	1,2,4-Trichlorobenzene	143	
	1,2-D+ 1,3-D + C-3 Compounds	108	
	1,2-Dichloropropane	143	
	2,3,7,8-TCDD (dioxin)	43	
	2,4,5-TP (silvex)	53	
	2,4-D	53	
	3-hydroxycarbofuran	57	
	Acetochlor	13	
	Alachlor	74	
	Aldicarb	57	
	Aldicarb Sulfone	57	
	Aldicarb Sulfoxide	57	
	Aldrin	53	
	Atrazine	82	
	Bentazon, Sodium Salt	53	
	Benzene (benzol)	143	
	Bromacil	62	
	Butachlor	62	
	Carbaryl	57	
	Carbofuran	57	
	Chlordane	53	
	Chloromethane (methyl chloride)	108	1
	Chlorothalonil	41	
	Dacthal Acid Breakdown products	26	
	Dalapon	53	
	DBCP	129	10
	DDE	13	
	Diazinon	62	
	Dicamba	53	
	Dieldrin	53	
	Dimethoate	62	
	Dinoseb	53	
	Diquat Dibromide	44	
	Diuron	49	
	Endothall	49	
	Endrin	53	
	EPTC	13	
	Ethylene Dibromide	129	
	Glyphosate, Isopropylamine Salt	56	
	Heptachlor	53	
	Heptachlor Epoxide	53	
	Hexachlorobenzene	53	
	Lindane (gamma-BHC)	53	
	Methomyl	57	

Methoxychlor	53
Methyl Bromide (bromomethane)	108
Metolachlor	62
Metribuzin	62
Molinate	88
Naphthalene	108
Ortho-Dichlorobenzene	143
Oxamyl	57
Picloram	52
Prometryn	62
Propachlor	41
Simazine	82
Terbacil	24
Thiobencarb	74
Toxaphene	53
Trichlorobenzenes	108
Xylene	143

Sacramento	Chemical	Wells Sampled	Wells with Detections
	1,3-Dichloropropene (1,3-D Telone)	81	
	1,1,2,2-Tetrachloroethane	232	
	1,2,4-Trichlorobenzene	230	
	1,2-D+ 1,3-D + C-3 Compounds	232	
	1,2-Dichloropropane	232	
	2,3,7,8-TCDD (dioxin)	48	
	2,4,5-T	29	
	2,4,5-TP (silvex)	42	
	2,4-D	42	
	3-hydroxycarbofuran	59	
	4(2,4-DB), Dimethylamine Salt	2	
	Acenaphthene	2	
	Acetochlor	21	
	Acifluorfen, Sodium Salt	2	
	Alachlor	66	
	Aldicarb	59	
	Aldicarb Sulfone	59	
	Aldicarb Sulfoxide	59	
	Aldrin	51	
	Atrazine	66	
	Bentazon, Sodium Salt	42	
	Benzene (benzol)	232	
	Bromacil	66	
	Butachlor	66	
	Carbaryl	59	
	Carbofuran	59	
	Carbon Disulfide	79	
	Chlordane	51	
	Chloromethane (methyl chloride)	232	
	Chlorothalonil	28	
	Dacthal Acid Breakdown products	29	1
	Dalapon	42	
	DBCP	55	1
	DDE	22	
	DDT	2	
	Diazinon	64	
	Dicamba	42	
	Dichlorprop, Butoxyethanol Ester	2	
	Dieldrin	51	
	Dimethoate	64	
	Dinoseb	42	
	Diquat Dibromide	51	
	Diuron	28	
	Endothall	51	
	Endrin	51	

EPTC	22
Ethylene Dibromide	55
Glyphosate, Isopropylamine Salt	51
Heptachlor	51
Heptachlor Epoxide	51
Hexachlorobenzene	51
Lindane (gamma-BHC)	51
Methiocarb	2
Methomyl	59
Methoxychlor	51
Methyl Bromide (bromomethane)	232
Metolachlor	66
Metribuzin	66
Molinate	73
Naphthalene	232
Ortho-Dichlorobenzene	232
Oxamyl	59
Picloram	42
Prometryn	64
Propachlor	66
Propazine	2
Simazine	66
Terbacil	21
Thiobencarb	68
Toxaphene	51
Trichlorobenzenes	232
Trifluralin	2
Xylene	232

San Bernardino	Chemical	Wells Sampled	Wells with Detections
	1,3-Dichloropropene (1,3-D Telone)	38	
	1,1,2,2-Tetrachloroethane	297	
	1,2,4-Trichlorobenzene	294	
	1,2-D+ 1,3-D + C-3 Compounds	152	
	1,2-Dichloropropane	297	1
	2,3,7,8-TCDD (dioxin)	80	
	2,4,5-TP (silvex)	86	
	2,4-D	84	
	3-hydroxycarbofuran	89	
	Acetochlor	13	
	Alachlor	86	
	Aldicarb	89	
	Aldicarb Sulfone	89	
	Aldicarb Sulfoxide	89	
	Aldrin	90	
	Atrazine	87	2
	Bentazon, Sodium Salt	86	
	Benzene (benzol)	297	
	Bromacil	86	
	Butachlor	86	
	Carbaryl	89	
	Carbofuran	89	
	Carbon Disulfide	2	
	Chlordane	90	
	Chloromethane (methyl chloride)	152	
	Chlorothalonil	90	
	Chlorthal-Dimethyl	8	
	Dacthal Acid Breakdown products	13	1
	Dalapon	84	
	DBCP	190	51
	DDE	13	
	Diazinon	84	
	Dicamba	86	
	Dieldrin	90	
	Dimethoate	84	
	Dinoseb	86	
	Diquat Dibromide	82	
	Diuron	66	
	Endothall	80	
	Endrin	90	
	EPTC	13	
	Ethylene Dibromide	171	
	Glyphosate, Isopropylamine Salt	89	
	Heptachlor	90	
	Heptachlor Epoxide	90	

Hexachlorobenzene	92
Lindane (gamma-BHC)	90
Methomyl	89
Methoxychlor	90
Methyl Bromide (bromomethane)	152
Metolachlor	86
Metribuzin	86
Molinate	106
Naphthalene	147
Ortho-Dichlorobenzene	297
Oxamyl	89
Picloram	86
Prometryn	86
Propachlor	89
Simazine	94
Terbacil	13
Thiobencarb	89
Toxaphene	90
Trichlorobenzenes	152
Xylene	275

San Diego	Chemical	Wells Sampled	Wells with Detections
	1,3-Dichloropropene (1,3-D Telone)	3	
	1,1,2,2-Tetrachloroethane	47	
	1,2,4-Trichlorobenzene	47	
	1,2-D+ 1,3-D + C-3 Compounds	46	
	1,2-Dichloropropane	47	1
	2,3,7,8-TCDD (dioxin)	24	
	2,4,5-T	11	
	2,4,5-TP (silvex)	31	
	2,4-D	31	
	3-hydroxycarbofuran	30	
	4(2,4-DB), Dimethylamine Salt	7	
	Acenaphthene	8	
	Acetochlor	19	
	Acifluorfen, Sodium Salt	2	
	Alachlor	40	
	Aldicarb	30	
	Aldicarb Sulfone	30	
	Aldicarb Sulfoxide	30	
	Aldrin	31	
	Atrazine	40	
	Bentazon, Sodium Salt	31	
	Benzene (benzol)	47	
	Bromacil	30	
	Butachlor	30	
	Carbaryl	30	
	Carbofuran	30	
	Carbon Disulfide	3	
	Chlordane	31	
	Chloromethane (methyl chloride)	46	
	Chlorothalonil	28	
	Dacthal Acid Breakdown products	21	
	Dalapon	30	
	DBCP	32	
	DDE	21	
	DDT	2	
	Diazinon	28	
	Dicamba	31	
	Dichlorprop, Butoxyethanol Ester	2	
	Dieldrin	31	
	Dimethoate	28	
	Dinoseb	31	
	Diquat Dibromide	21	
	Diuron	6	
	Endothall	22	
	Endrin	31	

EPTC	21
Ethylene Dibromide	32
Glyphosate, Isopropylamine Salt	31
Heptachlor	31
Heptachlor Epoxide	31
Hexachlorobenzene	32
Lindane (gamma-BHC)	31
Methiocarb	7
Methomyl	30
Methoxychlor	31
Methyl Bromide (bromomethane)	46
Metolachlor	30
Metribuzin	30
Molinate	44
Naphthalene	32
Ortho-Dichlorobenzene	47
Oxamyl	30
Paraquat Dichloride	5
Picloram	31
Prometryn	28
Propachlor	31
Propazine	2
Propoxur	5
Simazine	40
Terbacil	19
Thiobencarb	31
Toxaphene	31
Trichlorobenzenes	46
Trifluralin	2
Xylene	47

San Joaquin	Chemical	Wells Sampled	Wells with Detections
	1,3-Dichloropropene (1,3-D Telone)	15	
	1,1,2,2-Tetrachloroethane	74	
	1,2,4-Trichlorobenzene	67	
	1,2-D+ 1,3-D + C-3 Compounds	62	
	1,2-Dichloropropane	68	
	2,3,7,8-TCDD (dioxin)	3	
	2,4,5-T	1	
	2,4,5-TP (silvex)	4	
	2,4-D	4	
	3-hydroxycarbofuran	1	
	Alachlor	17	
	Aldicarb	4	
	Aldicarb Sulfone	4	
	Aldicarb Sulfoxide	4	
	Aldrin	8	
	Atrazine	21	
	Bentazon, Sodium Salt	4	
	Benzene (benzol)	74	
	Bromacil	17	
	Butachlor	17	
	Carbaryl	4	
	Carbofuran	4	
	Chlordane	8	
	Chloromethane (methyl chloride)	49	2
	Chlorothalonil	8	
	Dacthal Acid Breakdown products	4	
	Dalapon	4	
	DBCP	47	22
	Diazinon	12	
	Dicamba	4	
	Dieldrin	8	
	Dimethoate	17	
	Dinoseb	4	
	Diquat Dibromide	7	
	Endothall	1	
	Endrin	8	
	Ethylene Dibromide	43	1
	Glyphosate, Isopropylamine Salt	7	
	Heptachlor	8	
	Heptachlor Epoxide	8	
	Hexachlorobenzene	8	
	Lindane (gamma-BHC)	8	
	Methomyl	4	
	Methoxychlor	8	
	Methyl Bromide (bromomethane)	49	

Metolachlor	17
Metribuzin	17
Molinate	17
Naphthalene	44
Ortho-Dichlorobenzene	74
Oxamyl	4
Picloram	4
Prometryn	17
Propachlor	17
Simazine	21
Thiobencarb	17
Toxaphene	8
Trichlorobenzenes	56
Xylene	73

San Luis Obispo	Chemical	Wells Sampled	Wells with Detections
	1,1,2,2-Tetrachloroethane	49	
	1,2,4-Trichlorobenzene	43	
	1,2-D+ 1,3-D + C-3 Compounds	21	
	1,2-Dichloropropane	49	
	2,3,7,8-TCDD (dioxin)	1	
	2,4,5-T	3	
	2,4,5-TP (silvex)	15	
	2,4-D	15	
	3-hydroxycarbofuran	15	
	4(2,4-DB), Dimethylamine Salt	1	
	Alachlor	26	
	Aldicarb	15	
	Aldicarb Sulfone	15	
	Aldicarb Sulfoxide	15	
	Aldrin	6	
	Atrazine	31	
	Bentazon, Sodium Salt	15	
	Benzene (benzol)	48	
	Bromacil	24	
	Butachlor	24	
	Carbaryl	15	
	Carbofuran	15	
	Chlordane	6	
	Chloromethane (methyl chloride)	21	
	Chlorothalonil	4	
	Dalapon	15	
	DBCP	33	1
	Diazinon	24	
	Dicamba	15	
	Dieldrin	6	
	Dimethoate	24	
	Dinoseb	15	
	Diquat Dibromide	19	
	Diuron	8	
	Endothall	1	
	Endrin	6	
	Ethylene Dibromide	33	
	Glyphosate, Isopropylamine Salt	1	
	Heptachlor	6	
	Heptachlor Epoxide	6	
	Hexachlorobenzene	6	
	Lindane (gamma-BHC)	6	
	Methiocarb	1	
	Methomyl	15	
	Methoxychlor	6	

Methyl Bromide (bromomethane)	21
Metolachlor	24
Metribuzin	24
Molinate	32
Naphthalene	3
Ortho-Dichlorobenzene	48
Oxamyl	15
Picloram	15
Prometryn	24
Propachlor	7
Propoxur	1
Simazine	31
Thiobencarb	24
Toxaphene	6
Trichlorobenzenes	21
Xylene	49

San Mateo	Chemical	Wells Sampled	Wells with Detections
	1,1,2,2-Tetrachloroethane	18	
	1,2,4-Trichlorobenzene	18	
	1,2-D+ 1,3-D + C-3 Compounds	18	
	1,2-Dichloropropane	18	1
	2,3,7,8-TCDD (dioxin)	9	
	2,4,5-T	10	
	2,4,5-TP (silvex)	13	
	2,4-D	13	
	3-hydroxycarbofuran	12	
	Acetochlor	1	
	Alachlor	13	
	Aldicarb	12	
	Aldicarb Sulfone	12	
	Aldicarb Sulfoxide	12	
	Aldrin	11	
	Atrazine	13	
	Bentazon, Sodium Salt	13	
	Benzene (benzol)	18	
	Bromacil	11	
	Butachlor	11	
	Carbaryl	12	
	Carbofuran	13	
	Chlordane	13	
	Chloromethane (methyl chloride)	16	
	Chlorothalonil	10	
	Dacthal Acid Breakdown products	4	
	Dalapon	13	
	DBCP	14	
	DDE	1	
	Diazinon	11	
	Dicamba	13	
	Dieldrin	10	
	Dimethoate	11	
	Dinoseb	13	
	Diquat Dibromide	13	
	Diuron	2	
	Endothall	13	
	Endrin	13	
	EPTC	1	
	Ethylene Dibromide	14	
	Glyphosate, Isopropylamine Salt	13	
	Heptachlor	13	
	Heptachlor Epoxide	13	
	Hexachlorobenzene	13	
	Lindane (gamma-BHC)	13	

Methomyl	12
Methoxychlor	13
Methyl Bromide (bromomethane)	16
Metolachlor	11
Metribuzin	11
Molinate	14
Naphthalene	16
Ortho-Dichlorobenzene	18
Oxamyl	13
Picloram	13
Prometryn	11
Propachlor	11
Simazine	13
Terbacil	1
Thiobencarb	13
Toxaphene	13
Trichlorobenzenes	16
Xylene	18

Santa Clara	Chemical	Wells Sampled	Wells with Detections
	1,3-Dichloropropene (1,3-D Telone)	9	
	1,1,2,2-Tetrachloroethane	147	
	1,2,4-Trichlorobenzene	144	
	1,2-D+ 1,3-D + C-3 Compounds	146	
	1,2-Dichloropropane	147	
	2,3,7,8-TCDD (dioxin)	30	
	2,4,5-T	22	
	2,4,5-TP (silvex)	41	
	2,4-D	41	
	3-hydroxycarbofuran	37	
	Acetochlor	24	
	Alachlor	39	
	Aldicarb	37	
	Aldicarb Sulfone	37	
	Aldicarb Sulfoxide	37	
	Aldrin	21	
	Atrazine	39	
	Bentazon, Sodium Salt	41	
	Benzene (benzol)	147	
	Bromacil	24	
	Butachlor	24	
	Carbaryl	37	
	Carbofuran	39	
	Carbon Disulfide	1	
	Chlordane	36	
	Chloromethane (methyl chloride)	107	
	Chlorothalonil	16	
	Chlorthal-Dimethyl	2	
	Dacthal Acid Breakdown products	36	1
	Dalapon	41	
	DBCP	45	
	DDE	22	
	Diazinon	24	
	Dicamba	41	
	Dieldrin	21	
	Dimethoate	24	
	Dinoseb	41	
	Diquat Dibromide	38	
	Diuron	21	
	Endothall	39	
	Endrin	36	
	EPTC	22	
	Ethylene Dibromide	45	
	Glyphosate, Isopropylamine Salt	39	
	Heptachlor	36	

Heptachlor Epoxide	36
Hexachlorobenzene	44
Lindane (gamma-BHC)	36
Methiocarb	1
Methomyl	37
Methoxychlor	36
Methyl Bromide (bromomethane)	107
Metolachlor	24
Metribuzin	24
Molinate	42
Naphthalene	144
Ortho-Dichlorobenzene	147
Oxamyl	39
Paraquat Dichloride	1
Picloram	41
Prometryn	24
Propachlor	24
Propoxur	1
Simazine	39
Terbacil	24
Thiobencarb	41
Toxaphene	36
Trichlorobenzenes	146
Xylene	145

Sonoma	Chemical	Wells Sampled	Wells with Detections
	1,3-Dichloropropene (1,3-D Telone)	1	
	1,1,2,2-Tetrachloroethane	41	
	1,2,4-Trichlorobenzene	30	
	1,2-D+ 1,3-D + C-3 Compounds	41	
	1,2-Dichloropropane	41	
	2,3,7,8-TCDD (dioxin)	6	
	2,4,5-T	31	
	2,4,5-TP (silvex)	42	
	2,4-D	41	
	3-hydroxycarbofuran	28	
	4(2,4-DB), Dimethylamine Salt	22	
	Acetochlor	6	
	Acifluorfen, Sodium Salt	7	
	Acrylonitrile	6	
	Alachlor	25	
	Aldicarb	27	
	Aldicarb Sulfone	27	
	Aldicarb Sulfoxide	27	
	Aldrin	26	
	Atrazine	41	
	Bentazon, Sodium Salt	40	
	Benzene (benzol)	41	
	Bhc (other Than Gamma Isomer)	6	
	Bromacil	22	
	Butachlor	22	
	Carbaryl	27	
	Carbofuran	33	
	Carbon Disulfide	7	
	Chlordane	23	
	Chlorobenzilate	6	
	Chloromethane (methyl chloride)	40	
	Chloroneb	6	
	Chlorothalonil	9	
	Dacthal Acid Breakdown products	17	
	Dalapon	43	
	DBCP	22	
	DDD	6	
	DDE	12	
	DDT	6	
	Diazinon	18	
	Dicamba	44	
	Dichlorprop, Butoxyethanol Ester	6	
	Dieldrin	24	
	Dimethoate	22	
	Dinoseb	43	

Diquat Dibromide	41	
Endosulfan	6	
Endosulfan Sulfate	6	
Endothall	39	
Endrin	24	
Endrin Aldehyde	6	
EPTC	6	
Ethylene Dibromide	29	1
Glyphosate, Isopropylamine Salt	5	
Heptachlor	22	
Heptachlor Epoxide	24	
Hexachlorobenzene	23	
Lindane (gamma-BHC)	25	
Methiocarb	10	
Methomyl	28	
Methoxychlor	25	
Methyl Bromide (bromomethane)	40	
Metolachlor	22	
Metribuzin	22	
Molinate	26	
Naphthalene	20	
Ortho-Dichlorobenzene	41	
Oxamyl	40	
Paraquat Dichloride	1	
Permethrin	6	
Permethrin, Other Related	6	
Picloram	44	
Prometryn	22	
Propachlor	25	
Propoxur	9	
Simazine	41	
Terbacil	6	
Thiobencarb	22	
Toxaphene	23	
Trichlorobenzenes	41	
Trifluralin	13	
Xylene	41	

Stanislaus	Chemical	Wells Sampled	Wells with Detections
	1,3-Dichloropropene (1,3-D Telone)	3	
	(s)-metolachlor	6	1
	1,1,2,2-Tetrachloroethane	132	
	1,2,4-Trichlorobenzene	132	
	1,2-D+ 1,3-D + C-3 Compounds	132	
	1,2-Dichloropropane	132	
	2,4,5-T	26	
	2,4,5-TP (silvex)	29	
	2,4-D	29	
	3-hydroxycarbofuran	26	
	ACET	6	2
	Acetochlor	10	
	Alachlor	42	
	Alachlor ESA	6	1
	Alachlor OXA	6	
	Aldicarb	26	
	Aldicarb Sulfone	26	
	Aldicarb Sulfoxide	26	
	Aldrin	28	
	Atrazine	42	
	Bentazon, Sodium Salt	29	
	Benzene (benzol)	132	
	Bromacil	42	1
	Butachlor	36	
	Carbaryl	26	
	Carbofuran	26	
	Chlordane	28	
	Chloromethane (methyl chloride)	132	
	Chlorothalonil	28	
	Dacthal Acid Breakdown products	10	
	Dalapon	29	
	DBCP	118	41
	DDE	10	
	Deethyl-atrazine	6	
	Demethylnorflurazon	6	2
	Diaminochlorotriazine (DACT)	6	5
	Diazinon	36	
	Dicamba	29	
	Dieldrin	28	
	Dimethoate	36	
	Dinoseb	29	
	Diquat Dibromide	17	
	Diuron	15	
	Endothall	18	
	Endrin	28	

EPTC	10	
Ethylene Dibromide	111	
Glyphosate, Isopropylamine Salt	29	
Heptachlor	28	
Heptachlor Epoxide	28	
Hexachlorobenzene	28	
Hexazinone	6	1
Lindane (gamma-BHC)	28	
Methomyl	26	
Methoxychlor	28	
Methyl Bromide (bromomethane)	132	
Metolachlor	36	
Metolachlor ESA	6	5
Metolachlor OXA	6	1
Metribuzin	36	
Molinate	41	
Naphthalene	121	
Norflurazon	6	
Ortho-Dichlorobenzene	132	
Oxamyl	26	
Picloram	29	
Prometon	6	
Prometryn	36	
Propachlor	36	
Simazine	42	
Terbacil	10	
Thiobencarb	39	
Toxaphene	28	
Trichlorobenzenes	132	
Xylene	132	

Tulare	Chemical	Wells Sampled	Wells with Detections
	1,3-Dichloropropene (1,3-D Telone)	14	
	(s)-metolachlor	6	1
	1,1,2,2-Tetrachloroethane	109	
	1,2,4-Trichlorobenzene	108	
	1,2-D+ 1,3-D + C-3 Compounds	109	
	1,2-Dichloropropane	108	
	2,4,5-T	9	
	2,4,5-TP (silvex)	12	
	2,4-D	12	
	3-hydroxycarbofuran	14	
	ACET	28	22
	Acetochlor	2	
	Alachlor	96	
	Alachlor ESA	6	
	Alachlor OXA	6	
	Aldicarb	14	
	Aldicarb Sulfone	14	
	Aldicarb Sulfoxide	14	
	Aldrin	32	
	Atrazine	117	1
	Bentazon, Sodium Salt	12	
	Benzene (benzol)	109	
	Bromacil	111	14
	Butachlor	83	
	Carbaryl	14	
	Carbofuran	17	
	Chlordane	34	
	Chloromethane (methyl chloride)	101	
	Chlorothalonil	15	
	Dacthal Acid Breakdown products	4	1
	Dalapon	12	
	DBCP	100	44
	DDE	2	
	Deethyl-atrazine	28	4
	Demethylnorflurazon	26	9
	Diaminochlorotriazine (DACT)	28	20
	Diazinon	29	
	Dicamba	9	
	Dieldrin	32	
	Dimethoate	83	
	Dinoseb	12	
	Diquat Dibromide	4	
	Diuron	32	17
	Endothall	5	
	Endrin	35	

EPTC	2	
Ethylene Dibromide	97	
Glyphosate, Isopropylamine Salt	1	
Heptachlor	34	
Heptachlor Epoxide	35	
Hexachlorobenzene	32	
Hexazinone	28	
Lindane (gamma-BHC)	35	
Methiocarb	3	
Methomyl	14	
Methoxychlor	35	
Methyl Bromide (bromomethane)	102	
Metolachlor	83	
Metolachlor ESA	6	1
Metolachlor OXA	6	
Metribuzin	83	
Molinate	83	
Naphthalene	108	
Norflurazon	28	8
Ortho-Dichlorobenzene	109	
Oxamyl	17	
Picloram	12	
Prometon	28	
Prometryn	83	
Propachlor	83	
Propoxur	3	
Simazine	117	20
Terbacil	2	
Thiobencarb	83	
Toxaphene	34	
Trichlorobenzenes	109	
Xylene	108	

Ventura	Chemical	Wells Sampled	Wells with Detections
	1,3-Dichloropropene (1,3-D Telone)	24	
	1,1,2,2-Tetrachloroethane	25	
	1,2,4-Trichlorobenzene	25	
	1,2-D+ 1,3-D + C-3 Compounds	23	
	1,2-Dichloropropane	25	
	2,4,5-T	8	
	2,4,5-TP (silvex)	9	
	2,4-D	9	
	3-hydroxycarbofuran	7	
	Alachlor	18	
	Aldicarb	7	
	Aldicarb Sulfone	7	
	Aldicarb Sulfoxide	7	
	Aldrin	10	
	Atrazine	19	
	Bentazon, Sodium Salt	9	
	Benzene (benzol)	34	
	Bromacil	13	
	Butachlor	13	
	Carbaryl	7	
	Carbofuran	7	
	Chlordane	10	
	Chloromethane (methyl chloride)	23	
	Chlorothalonil	1	
	Dacthal Acid Breakdown products	2	
	Dalapon	10	
	DBCP	22	
	Diazinon	13	
	Dicamba	9	
	Dieldrin	10	
	Dimethoate	13	
	Dinoseb	9	
	Diquat Dibromide	5	
	Diuron	8	
	Endrin	10	
	Ethylene Dibromide	22	
	Heptachlor	10	
	Heptachlor Epoxide	10	
	Hexachlorobenzene	10	
	Lindane (gamma-BHC)	10	
	Methomyl	7	
	Methoxychlor	10	
	Methyl Bromide (bromomethane)	23	
	Metolachlor	13	
	Metribuzin	13	

Molinate	13	
Naphthalene	22	
Ortho-Dichlorobenzene	25	
Oxamyl	7	
Picloram	10	
Prometryn	13	
Propachlor	14	
Simazine	19	
Thiobencarb	13	
Toxaphene	10	
Trichlorobenzenes	23	
Xylene	37	1

Yuba	Chemical	Wells Sampled	Wells with Detections
	1,1,2,2-Tetrachloroethane	26	
	1,2,4-Trichlorobenzene	26	
	1,2-D+ 1,3-D + C-3 Compounds	26	
	1,2-Dichloropropane	26	
	2,4,5-T	1	
	2,4,5-TP (silvex)	1	
	2,4-D	1	
	Aldrin	1	
	Bentazon, Sodium Salt	1	
	Benzene (benzol)	27	1
	Carbon Disulfide	1	
	Chlordane	1	
	Chloromethane (methyl chloride)	25	
	Chlorothalonil	1	
	Dalapon	1	
	DBCP	11	
	Dicamba	1	
	Dieldrin	1	
	Dinoseb	1	
	Endrin	1	
	Ethylene Dibromide	11	
	Glyphosate, Isopropylamine Salt	2	
	Heptachlor	1	
	Heptachlor Epoxide	1	
	Hexachlorobenzene	1	
	Lindane (gamma-BHC)	1	
	Methoxychlor	1	
	Methyl Bromide (bromomethane)	25	
	Naphthalene	26	
	Ortho-Dichlorobenzene	26	
	Picloram	1	
	Toxaphene	1	
	Trichlorobenzenes	26	
	Xylene	26	1

APPENDIX B

Studies Included in the 2005 Update Report

A summary of the well sampling surveys that were added to the well inventory database during the period July 1, 2004, through June 30, 2005. The study number assigned by DPR is shown to the left.

DEPARTMENT OF HEALTH SERVICES (Sanitary Engineering Branch)

STUDY	COUNTY *Study type (italics)*	WELLS SAMPLED	SAMPLING DATES	CHEMICALS SAMPLED (UNDERLINE INDICATES A VERIFIED DETECTION)
0023	52 counties *Mandated Sampling*	3,882 wells	January-2004 through December-2004	142 chemicals

US GEOLOGICAL SURVEY

STUDY	COUNTY *Study type (italics)*	WELLS SAMPLED	SAMPLING DATES	CHEMICALS SAMPLED (UNDERLINE INDICATES A VERIFIED DETECTION)
0461	Stanislaus/Tulare *Metolachlor survey*	2 wells	April-2004 and July-2002	metolachlor

DEPARTMENT OF PESTICIDE REGULATION

STUDY	COUNTY *Study type (italics)*	WELLS SAMPLED	SAMPLING DATES	CHEMICALS SAMPLED (UNDERLINE INDICATES A VERIFIED DETECTION)
0440	Fresno/Tulare *Well Network*	74 wells	October-2001 through May-2003	atrazine, bromacil, simazine, diuron, prometon, hexazinone, norflurazon, DEA, ACET, DACT
0462	Stanislaus *Four-section survey for metolachlor*	6 wells	August-2004	atrazine, bromacil, simazine, diuron, prometon, hexazinone, norflurazon, DEA, ACET, DACT, alachlor, alachlor ESA and OXA Breakdown products, metolachlor, and metolachlor OXA and ESA Breakdown products and demethylnorflurazon
0463	Tulare *Four-section survey for metolachlor*	6 wells	August-2004	atrazine, bromacil, simazine, diuron, prometon, hexazinone, norflurazon, DEA, ACET, DACT, alachlor, alachlor ESA and OXA Breakdown products, metolachlor, and metolachlor OXA and ESA Breakdown products and demethylnorflurazon
Memo Only	Fresno	Diazinon		Transcription error

STUDY	COUNTY *Study type (italics)*	WELLS SAMPLED	SAMPLING DATES	CHEMICALS SAMPLED (UNDERLINE INDICATES A VERIFIED DETECTION)
0440	Fresno/Tulare *Well Network*	74 wells	October-2001 through May-2003	atrazine, bromacil, simazine, diuron, prometon, hexazinone, norflurazon, DEA, ACET, DACT
0462	Stanislaus *Four-section survey for metolachlor*	6 wells	August-2004	atrazine, bromacil, simazine, diuron, prometon, hexazinone, norflurazon, DEA, ACET, DACT, alachlor, alachlor ESA and OXA Breakdown products, metolachlor, and metolachlor OXA and ESA Breakdown products and demethylnorflurazon
Memo Only	Los Angeles	Methyl bromide		Restested by DHS—none detected

APPENDIX C

Summary of Compounds Detected and Reported to DPR

The following table provides updated information, as of June 30, 2004, of all reported pesticide detections in ground water. It includes the historical range of residue concentrations for all compounds detected and the range of residue concentrations for compounds detected during this fiscal year, from July 1, 2004 to June 30, 2005.

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
1,1,2,2-tetrachloroethane	57 counties 8,360 wells	0.83 - 51.4		CDHS - 1 PHG - 0.1	Herbicide. Not registered for agricultural use (NR).
1,2,4-trichlorobenzene	58 counties 7,546 wells	0.53 - 21		CDHS - 5 PHG - 0.5	Herbicide. NR.
1,2-D + 1,3-D + C-3 Compounds	57 counties 7,077 wells	1.2		See 1,2-D and 1,3-D limits below	Fumigant. NR. Regulations were adopted in 1985 that prohibit the use or sale of pesticides in California in which 1,2-D exceeds 0.5% of the total formulation.
1,2-dichloropropane (1,2-D)	58 counties 11,885 wells	0.1 - 160	0.54 – 3.7	CDHS - 5 USEPA - 5 PHG - 0.5	Fumigant. NR. Source of residues were determined by DPR to be due to historical non-point source, legal, agricultural use. Regulations were adopted in 1985 that prohibit the use or sale of pesticides in California in which 1,2-D exceeds 0.5% of the total formulation. Detections referred to SWRCB.
1,3-dichloropropene (1,3-D)	56 counties 9,110 wells	0.84 - 1.9		CDHS - 0.5 PHG - 0.2	Fumigant. Active registration in California (AR).

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
2,4,5-T	43 counties 1,572 wells	0.02 - 0.21		USEPA IRIS - 70 USEPA SNARL - 70	Herbicide. NR.
2,4,5-TP (silvex)	58 counties 56,094wells	0.15 - 1.4		CDHS - 50 USEPA - 50 PHG - 25	Herbicide. NR.
2,4-D	58 counties 6,799 wells	0.3 - 46		CDHS - 70 USEPA - 70 PHG - 70	Selective herbicide. AR.
2,4-DP, Isooctyl Ester	9 counties 106 wells	0.01 - 0.06		No limits established	Selective herbicide. AR.
2-hydroxycyclohexyl Hexazinone	8 counties 69 wells	0.126		No limits established	Breakdown product of hexazinone.
Acenaphthene	24 counties 803 wells	98-117		U.S. EPA IRIS Rfd - 420	Fungicide. NR.

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
ACET	35 counties 1,091 wells	0.032 - 6	0.05-2.2	No limits established	Breakdown product of atrazine and simazine. This compound has contaminated ground water due to legal agricultural use (LAU) of atrazine or simazine. It is considered as toxic as atrazine and simazine and detections of ACET have been used to regulate the use of both parent compounds. Detections were due to LAU.
Alachlor	55 counties 7,274 wells	0.1 - 9		CDHS - 2 USEPA - 2 PHG - 4	Selective herbicide. AR.
Alachlor ESA	9 counties 100 wells	0.05 - 1.38	0.077	No limits established	Breakdown product of alachlor. Alachlor is AR. DPR determined that contamination of ground water occurred from non-point source pesticide applications. A review of the compound by DPR's Medical Toxicology Branch personnel determined that toxicological data are equivocal and require further consultation with other agencies. Therefore, since DPR cannot determine whether alachlor ESA poses a threat to public health, the alachlor parent is not subject to the formal PCPA review process at this time.

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
Alachlor OXA	9 counties 100 wells	0.05 - 0.051		No limits established	Breakdown product of alachlor. Alachlor is AR.
Aldicarb	54 counties 5,430 wells	1.1 - 7.2		USEPA - 3 CDHS AL - 7	Systemic insecticide. AR.
Aldicarb Sulfone	50 counties 4,194 wells	0.05 - 1281		USEPA - 3 USEPA SNARL - 10 (10-day)	Breakdown product of aldicarb. Aldicarb is AR. This compound has contaminated ground water due to LAU of aldicarb.
Aldicarb Sulfoxide	50 counties 4,197 wells	0.06 - 13.2		USEPA - 4 USEPA SNARL - 10 (10-day)	Breakdown product of aldicarb. Aldicarb is AR. This compound has contaminated ground water due to LAU of aldicarb.

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
Aldrin	54 counties 5,105 wells	21-107		CDHS AL - 0.002 USEPA IRIS - 0.21 USEPA SNARL - 0.3 (10-day)	Insecticide. NR.
Atrazine	57 counties 11,791 wells	0.001 - 8.5	0.056-2.6	CDHS - 1 USEPA - 3 PHG - 0.15	Selective herbicide. AR. This compound has contaminated ground water due to LAU. Detections were determined to be due to LAU.
Azinphos-methyl	43 counties 1,292 wells	0.014		No limits established	Insecticide. AR.
Benomyl	38 counties 1,090 wells	190 - 500		USEPA IRIS - 350	Systemic fungicide. AR.
Bentazon, Sodium Salt	55 counties 5,259 wells	0.02 - 20		CDHS - 18 PHG - 200	Selective herbicide. AR

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
Benzene (benzol)	57 counties 7,111 wells	0.2 - 102	0.62-20	CDHS - 1 USEPA - 5 PHG - 0.15	Benzene was an ingredient in some early grain fumigants. NR. Non-agricultural uses of industrial chemicals may contribute to these findings. Detections referred to SWRCB.
BHC	46 counties 2,062 wells	0.08		No limits established	Insecticide. NR.
Bromacil	56 counties 9,608 wells	0.025 - 23	0.05-6.06	USEPA SNARL - 90	Selective herbicide. AR. This compound has contaminated ground water due to LAU. Detections were determined to be due to LAU.
Butachlor	52 counties 4,948 wells	0.39		No limits established	Selective herbicide. NR.
Captan	38 counties 1,470 wells	0.1 - 0.5		CDHS AL - 1.5, USEPA IRIS - 910	Fungicide. AR.
Carbaryl	52 counties 5,476 wells	2-55		CDHS AL - 700, USEPA IRIS - 700 USEPA SNARL - 700	Insecticide. AR.
Carbofuran	53 counties 6,093 wells	0.016 - 0.686		CDHS - 18 USEPA - 40 PHG - 1.7	Insecticide. AR.

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
Carbon Disulfide	20 counties 257 wells	0.2 - 5		CDHS AL - 160, USEPA IRIS - 700	Fumigant. NR.
Chlordane	56 counties 6,439 wells	20		CDHS - 0.1 USEPA - 2 PHG - 0.03	Insecticide. NR.
Chloromethane	57 counties 7,064 wells	0.5 - 37	0.5-2.1	USEPA SNARL - 3	Fumigant. NR. Non-pesticidal uses of industrial chemicals may contribute to these findings. Detections referred to SWRCB.
Chlorothalonil	50 counties 4,146 wells	0.8 - 1.1		USEPA IRIS - 110 USEPA SNARL - 200 (10-day)	Fungicide. AR.
Chlorpyrifos	38 counties 1,403 wells	0.02 - 0.06		USEPA IRIS - 21 USEPA SNARL - 20	Insecticide. AR.
Chlorthal-Dimethyl	33 counties 1,490 wells	0.03 - 300		USEPA IRIS - 70 USEPA SNARL - 70	Selective herbicide. AR.

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
Chlorthal-Dimethyl Acid Breakdown Products	37 counties 1,065 wells	0.03 - 10.9	1-4.9	No limits established	Breakdown product of chlorthal-dimethyl. DPR determined that this compound contaminated ground water due to non-point source applications of the parent, chlorthal-dimethyl. DPR reviewed toxicological studies and determined that at detection levels that were reported, this compound did not pose a threat to public health; so no further action required.
Coumaphos	11 counties 132 wells	1		No limits established	Insecticide. AR.
Dalapon	48 counties 4,552 wells	1-17		CDHS - 200 USEPA - 200 PHG - 790	Selective herbicide. NR.
DBCP	54 counties 12,017 wells	0.001 - 8000	0.01 - 2	CDHS - 0.2 USEPA - 0.2 PHG - 0.0017	Soil fumigant. NR. Source of residues considered by DPR to be from historical non-point source, LAU. Detections referred to SWRCB.
DDD	41 counties 1,814 wells	1.04		No limits established	Insecticide. NR.
DDE	43 counties 3,324 wells	0.01 - 0.09		No limits established	Breakdown product of DDT.

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
DDT	41 counties 2,019 wells	0.02 - 0.12		USEPA IRIS - 3.5	Insecticide. NR.
Deethyl-Atrazine (DEA)	36 counties 1,137 wells	0.001 - 2	0.05-0.303	No limits established	Breakdown product of atrazine. This compound has contaminated ground water due to LAU of atrazine. It is considered as toxic as atrazine and detections of DEA have been used to regulate the use of atrazine. Detections were determined to be LAU.
Demethylnorflurazon	3 counties 80 wells	0.24-0.57	0.05-0.813	No limits established	Breakdown product of norflurazon, which is AR. DPR assumes that this compound contaminated ground water due to non-point source applications of the parent, norflurazon and therefore detections are the result of LAU.
Demeton	46 counties 1,774 wells	1		USEPA IRIS - 0.3	Systemic-insecticide. NR.
DACT	24 counties 505 wells	0.05 - 6.9	0.05-5.587	No limits established	Breakdown product of atrazine and simazine. This compound has contaminated ground water due to LAU of atrazine or simazine. It is considered as toxic as atrazine and simazine and detections of DACT have been used to regulate the use of both compounds. Detections were determined to be LAU.

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
Diazinon	56 counties 6,743 wells	0.01 - 507	507	CDHS AL - 6 USEPA SNARL - 0.6	Insecticide. AR. Investigation by DPR found the detection to be due to a transcription error.
Dicamba	52 counties 4,353 wells	0.01 - 5		USEPA IRIS - 210 USEPA SNARL - 200	Selective herbicide. AR.
Dichlorprop	3 counties 49 wells	6.8		No limits established	Hormone-systemic type herbicide. NR.
Dichlorprop, Butooxyethanol Ester	25 counties 354 wells	0.1 - 6.8		No limits established	Hormone-systemic type herbicide. NR.
Dieldrin	56 counties 5,173 wells	0.05 - 7		CDHS AL - 0.002	Insecticide. NR.
Dimethoate	54 counties 6,195 wells	0.38 - 10		CDHS AL – 1, USEPA IRIS - 1.4	Insecticide. AR.
Diquat Dibromide	46 counties 4,168 wells	2 - 549.1		CDHS - 20 USEPA - 20 PHG - 15	Selective herbicide. AR.

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
Diuron	54 counties 7,682 wells	0.023 - 5.2	0.05-1.082	USEPA IRIS - 14 USEPA SNARL - 10	Selective herbicide. AR. This compound has contaminated ground water due to LAU. Detections reported this year were determined to be due to LAU.
Endosulfan	48 counties 2,780 wells	0.01 - 34.7		USEPA IRIS - 42	Insecticide. AR.
Endosulfan Sulfate	47 counties 2,133 wells	0.15 - 0.48		No limits established	Breakdown product of endosulfan. Endosulfan is AR.
Endothal, Disodium Salt	49 counties 3,631 wells	100 – 548.1		CDHS - 100 USEPA - 100 PHG - 580	Selective herbicide. NR. Early 1989 detections were not confirmed by DPR monitoring. Inactive in 1992.
Endrin	58 counties 6,791 wells	0.03 - 0.21		CDHS - 2 USEPA - 2 PHG - 2	Insecticide. NR.
EPTC	39 counties 2,204 wells	5.6 - 170		USEPA IRIS -180	Selective herbicide. AR.

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
Ethylene Dibromide	55 counties 8,006 wells	0.006 - 4.7	0.02-0.59	CDHS - 0.05 USEPA - 0.05 PHG - 0.01	Fumigant, insecticide, nematicide. NR since January 1987. Source of residues considered by DPR to be from historical non-point source, LAU. Referred to SWRCB.
Ethylene Dichloride	11 counties 197 wells	2.9		CDHS - 0.5 USEPA - 5 PHG - 0.4	Fumigant. NR.
Ethylene Thiourea	8 counties 67 wells	0.725		USEPA IRIS - 0.6 USEPA SNARL - 300 (10-day)	Fumigant. NR.
Glyphosate, Isopropylamine Salt	51 counties 4,305 wells	20		CDHS - 700 USEPA - 700 PHG - 1,000	Nonselective, postemergence herbicide. AR.
Heptachlor	56 counties 6,193 wells	0.01 - 0.25		CDHS - 0.01 USEPA - 0.4 PHG - 0.008	Insecticide. NR.
Heptachlor Epoxide	56 counties 6,186 wells	0.01		No limits established	Breakdown product of heptachlor. Heptachlor is NR.

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
Hexazinone	46 counties 2,013 wells	0.05 - 0.55	0.062-0.263	USEPA IRIS - 230 USEPA SNARL - 400	Selective herbicide. AR. Detections have been determined to result from non-point source pesticide applications but no LAU determination has been made.
Lindane (Gamma-BHC)	58 counties 6,871 wells	0.05 - 180		CDHS - 0.2 USEPA - 0.2 PHG - 0.032	Insecticide. AR.
Malathion	37 counties 1,220 wells	0.32		CDHS AL – 160, USEPA IRIS - 140 USEPA SNARL - 100	Insecticide. AR.
Merphos	21 counties 420 wells	1		USEPA IRIS - 0.2	Defoliant. NR.
Methomyl	51 counties 5,017 wells	0.8		USEPA IRIS - 180 USEPA SNARL - 200	Insecticide. AR.
Methoxychlor	57 counties 6,377 wells	0.5		CDHS - 30 USEPA - 40 PHG - 30	Insecticide. NR.

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
Methyl Bromide	58 counties 11,560 wells	0.5 - 6.4	1.4	USEPA IRIS - 9.8 USEPA SNARL - 10	Fumigant. AR. Detection is CUI.
Methylene Chloride	6 counties 61 wells	3-6		PHG - 4	Fumigant. NR.
(S)-metolachlor	11 counties 94 wells	0.036-0.1	0.036-0.1	USEPA SNARL - 100	Selective herbicide. AR. Detections reported by USGS were not verified in subsequent DPR sampling.
Metolachlor ESA	9 counties 100 wells	0.05 – 24	0.091-1.1	No limits established	Breakdown product of metolachlor. Metolachlor is AR. DPR determined that contamination of metolachlor in ground water occurred from non-point source pesticide applications. A review of the compound by DPR's Medical Toxicology Branch's personnel determined that toxicological data are equivocal and require further consultation with other agencies. Therefore, since DPR cannot determine whether metolachlor ESA poses a threat to public health, the metolachlor parent is not subject to the formal PCPA review process at this time.

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
Metolachlor OXA	9 counties 100 wells	0.05 - 2.65	0.279	No limits established	Breakdown product of metolachlor. Metolachlor is AR. DPR determined that contamination of metolachlor in ground water occurred from non-point source pesticide applications. A review of the compound by DPR's Medical Toxicology Branch's personnel determined that toxicological data are equivocal and require further consultation with other agencies. Therefore, since DPR cannot determine whether metolachlor OXA poses a threat to public health, the metolachlor parent is not subject to the formal PCPA review process at this time.
Mexacarbate	23 counties 427 wells	22		No limits established	Insecticide. NR
Molinate	55 counties 6,892 wells	0.002 - 29		CDHS - 20 USEPA IRIS - 14	Selective herbicide. AR.
Molinate Sulfoxide	17 counties 210 wells	0.8		No limits established	Breakdown product of molinate. Molinate is AR.
Monuron	25 counties 504 wells	0.04 - 2		No limits established	Herbicide. NR.
MTP	10 counties 274 wells	2.41 - 2.55		No limits established	Breakdown product of chlorthal-dimethyl. AR.

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
Naled	16 counties 221 wells	5		USEPA IRIS - 14	Insecticide. AR.
Naphthalene	57 counties 7,321 wells	0.5 - 66		CDHS A L-170, USEPA IRIS - 14 USEPA SNARL - 100	Fumigant. NR in California since 1991.
Norflurazon	31 counties 755 wells	0.022 –1.62	0.05-1.62	USEPA IRIS - 280	Selective herbicide. AR. This compound has contaminated ground water due to LAU. Detections were determined to be due to LAU.
Ortho-Dichlorobenzene	58 counties 10,719 wells	0.56 - 12		CDHS - 600 USEPA - 600 PHG - 600	Herbicide and insecticide. NR.
Paraquat Dichloride	26 counties 753 wells	0.91 - 16		USEPA IRIS - 3.2 USEPA SNARL - 30	Herbicide. AR.

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
Picloram	51 counties 4,621 wells	0.1 – 1.1		CDHS - 500 USEPA - 500 PHG - 500	Selective herbicide. NR.
Prometon	49 counties 4,796 wells	0.05 - 80	0.08-0.093	USEPA IRIS - 110 USEPA SNAR L-100	Nonselective herbicide. AR. This compound has contaminated ground water due to LAU. Detections were determined to be due to LAU.
Prometryn	57 counties 8,100 wells	0.1 - 0.5		USEPA IRIS - 28	Selective herbicide. AR.
Propachlor	52 counties 4,839 wells	1.1		USEPA IRIS - 91 USEPA SNARL - 90	Selective herbicide. NR.
Propazine	41 counties 1,097 wells	0.2		USEPA IRIS - 14 USEPA SNARL - 10	Selective herbicide. NR.
Propham	35 counties 1,063 wells	6		USEPA IRIS - 140 USEPA SNARL - 100	Selective herbicide. NR.

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
Propoxur	44 counties 1,230 wells	4-5		CDHS AL – 30, USEPA IRIS - 2.8 USEPA SNARL - 3	Insecticide. AR.
Simazine	57 counties 12,344 wells	0.002 - 49.2	0.05 – 1.3	CDHS - 4 USEPA - 4 PHG - 4	Selective herbicide. AR. This compound has contaminated ground water due to LAU. Detections were determined to be due to LAU.
Tebuthiuron	24 counties 162 wells	0.005 - 22.1		USEPA IRIS - 490 USEPA SNARL - 500	Herbicide. AR.
Tetrachloroethylene	9 counties 193 wells	0.2 - 2.5		CDHS - 5 USEPA - 5 PHG - 0.06	Insecticide. NR.
Tetrachlorovinphos	23 counties 189 wells	1		USEPA IRIS - 210	Insecticide. AR.
Thiobencarb	55 counties 6,588 wells	0.006 - 8.7		PHG - 70 USEPA IRIS - 70	Selective herbicide. AR.

Compound Detected	Number of Counties and Wells Reported since June, 2004	Historical Range of Residue Concentrations (ppb)	Fiscal Year 2004/2005: Range of Residue Concentrations (ppb)	Water Quality Limits(ppb)[(a)]	Fiscal Year 2004/2005 Information: Type of Compound, Registration Status, Comments
Thiram	2 counties 18 wells	5-17		USEPA IRIS - 35	Fungicide. AR.
Toxaphene	58 counties 6,914 wells	1-57		CDHS - 3 USEPA - 3 PHG - 0.03	Insecticide. NR.
TPA	10 counties 274 wells	0.1 - 15		No limits established	Breakdown product of chlorthal-dimethyl.
Trifluralin	34 counties 950 wells	0.01 - 0.9		USEPA SNARL - 5	Selective herbicide. AR.
Xylene	58 counties 10,558 wells	0.25 - 1100	0.25-2.8	CDHS - 1,750 USEPA - 10,000 PHG -1,800	Insecticide (NR) and solvent. Non-peticidal uses of industrial chemicals may contribute to these findings. Detections referred to SWRCB.

[(a)] CDHS = California Department of Health Services' drinking water standard, maximum contamination level (MCL); CDHS-AL = California Department of Health Services' action level; USEPA= U.S. Environmental Protection Agency's MCL; PHG = Office of Environmental Health Hazard Assessment's California public health goal; USEPA IRIS = U.S. EPA integrated risk information system reference dose as a drinking water level; USEPA SNARL = U.S EPA suggested no-adverse-response level for toxicity other than cancer risk.
Marshack, J.B. 2003. A Compilation of Water Quality Goals. Definition of water quality limits is given in Appendix D (Glossary of Terms).
NR: Not registered
AR: Actively registered in California
CUI: Currently under investigation by DPR
LAU: Legal agricultural use

APPENDIX D

Glossary of Terms

AB 1803 - (1983) (Chapter 881, Statutes of 1983) A law that required the California Department of Health Services (DHS) to evaluate each public water system to determine its potential for contamination. The systems were required to conduct specified water analyses and to report those results. Monitoring required by AB 1803 was completed in June 1989.

AB 2021 - See "Pesticide Contamination Prevention Act."

Action level (AL) - Published by DHS's Office of Drinking Water, ALs are based mainly on health affects. ALs are advisory to water suppliers. Although not legally enforceable, the majority of water suppliers have complied with action levels as though they were maximum contaminant levels.

Active ingredient - The chemical or chemicals in a pesticide formulation that are biologically active and which are capable, in themselves, of preventing, destroying, repelling or mitigating insects, fungi, rodents, weeds, or other pests.

Agricultural Commissioner - For each county in California, under supervision of DPR, the Agricultural Commissioner enforces the laws and regulations pertaining to agricultural and structural pest control and all other pesticide uses.

Agricultural use - (See also "legal agricultural use" and "legal agricultural use determination".) The use of any pesticide or method or device for the control of plant or animal pests, or any other pests, or the use of any pesticide for the regulation of plant growth or defoliation of plants. It excludes the sale or use of pesticides in properly labeled packages or containers which are intended only for any of the following: home use, use in structural pest control, industrial or institutional use, the control of an animal pest under the written prescription of a veterinarian, local districts, or other public agencies which have entered into and operate under a cooperative agreement with the Dept. of Public Health pursuant to section 2426 of the Health and Safety Code. (Food and Agricultural Code, section 11408)

Analysis – For the well inventory data, it is the act of determining whether a substance is present in a water sample using laboratory methodology.

Aquifer - A geologic formation, group of formations, or part of a formation, that is water bearing and which transmits water in sufficient quantity to supply springs and pumping wells.

Basin irrigation – ASAE (2001) definition: irrigation by flooding areas of level land surrounded by dikes. Used interchangeably with level border irrigation, but usually refers to smaller areas.

Birth Defect Prevention Act (BDPA) - (SB 950, 1984) A law requiring DPR to acquire certain toxicological data for registered pesticides in order to make a scientific determination that their uses will not cause significant adverse health effects. The BDPA prohibits the registration of any new pesticide active ingredient if required mandatory health effects studies are missing, incomplete, or invalid. Pesticide active ingredients already registered that are identified as having the potential to cause significant adverse health effects following a thorough review by DPR scientific staff will be canceled.

Chemigation - The application of pesticides through irrigation water, using irrigation techniques and equipment.

Confirmed detection - For purposes of the well inventory database, the detection of a compound in two discrete samples taken from the same well during the time period of a single monitoring survey.

Database record - Each chemical analysis of a well water sample for a pesticide residue or related chemical constitutes one record in the database. Each record may contain up to 149 columns of data.

Degradation - The breakdown of a chemical by the action of microbes, water, air, sunlight, or other agents.

Detection - A well water sample in which the presence of a pesticide chemical is detected at or above the, minimum detection limit of the analytical instruments used for analysis of the compound under investigation. A detection may be designated as confirmed or unconfirmed.

Discrete sample - Samples taken separately from a well; not a single sample split into smaller samples.

Established PMZ - A Pesticide Management Zone (PMZ) (see def.) formally listed in section 6802, Title 3 of the California Code of Regulations (3CCR).

Ground water protection areas (GWPA) - Areas of the state identified by DPR that are vulnerable to pesticide movement to ground water. GWPAs are identified by base meridian, township, range and section. Currently, there are leaching GWPAs and runoff GWPAs. GWPAs include all sections of land where pesticides have been found in ground water due to

legal agricultural use (see Pesticide Management Zones*)* and additional sections of land that contain similar characteristics of areas where pesticides have been found in ground water.

Ground Water Protection List (GWPL) - A list, required by the PCPA and established in section 6800 (3CCR), of pesticides having the potential to pollute ground water. The GWPL is divided into two sub lists. Sub list (a) is comprised of chemicals that have been detected in ground water as a result of legal agricultural use. Pesticide active ingredients whose physicochemical properties exceed the specific numerical values (see def.) and that are labeled for soil application under certain conditions or are required or recommended to be followed by flood or furrow irrigation within 72 hours are placed on sub list (b) of the GWPL. Chemicals placed on the GWPL sub list (a) are subject to certain restrictions.

Health advisory level (HAL) - An advisory number published by U.S. EPA's Office of Drinking Water and Office of Water Regulations and Standards. Short-term (10 days or less), long-term (7 years or less), and lifetime exposure health advisories for non-carcinogens and suspected human carcinogens are included where data sufficient for derivation of the advisories exist. HALs are a guideline, which include a margin of safety to protect human health. For lifetime HALs, water containing pesticides at or below the HAL is acceptable for drinking every day over the course of one's lifetime.

Initial detection sample - For a single study and a particular well, the initial detection sample for a chemical will be the positive sample with the earliest sampling date and/or time. Replicate samples are coded in relation to the initial sample detection.

Large water system well - A well supplying 200 or more service connections.

Leaching - A pathway by which agricultural chemicals may reach ground water; the process by which residues are dissolved in soil water and follow the movement of water through the soil matrix as it recharges a ground water aquifer.

Legal agricultural use - The application of a pesticide, according to its labeled directions and in accordance with federal and state laws and regulations, for agricultural use as defined in Food and Agricultural Code, section 11408. (See "agricultural use.”)

Legal agricultural use determination - A determination required by section 13149 (FAC) and based upon the following criteria: (1) the detection of a pesticide ingredient or its breakdown product in ground water that has been verified according to DPR criteria; (2) a detection of the same pesticide ingredient or its breakdown product in ground water, verified at a second site within a four-section area of the original detection; (3) the detected pesticide ingredient must be formulated in a product which has one or more agricultural uses listed on its label; (4) the

application of the agricultural use product(s) in the vicinity of the reported detections should either be documented historically, confirmed by local interviews, or presumed by the identification of a target pest or commodity; and (5) the detected pesticide is not exclusively due to illegal use or a point source. The director may consider a preponderance of evidence as meeting these criteria.

Maximum contaminant levels (MCLs) - MCLs are part of the drinking water quality standards adopted by DHS and by USEPA under the Safe Drinking Water Act. MCLs are formally established in regulation and are enforceable by DHS on water suppliers.

Minimum detection limit (MDL) - The lowest concentration of a substance that a method of analysis can quantify reliably. The MDL is established in the protocol for a study either as a result of a method validation study or by using accepted proven analytical methods (e.g., EPA methods).

Mitigation measure - An activity to substantially reduce any adverse impact of a given condition.

Model - Mathematical equations that represent certain processes. These equations can be implemented in a computer program in order to facilitate calculations and test model predictions against measured data.

Monitoring well - A well used principally for any of the follow purposes: (1) observing ground water levels and flow conditions, (2) obtaining samples for determining ground water quality, or (3) evaluating hydraulic properties of water-bearing strata.

Non-crop areas - These areas include rights-of-way, golf courses, cemeteries, and industrial and institutional sites. Agricultural use of pesticides in non-crop areas include weed control around buildings on a farm or on rights-of-way, irrigation canals and ditches, golf courses, parks, and cemeteries.

Non-point source – Contamination that cannot be traced to a small definable location (compare with "point source"), e.g., applications of agricultural chemicals to crops.

Organic matter - Plant and animal debris or remains found in the soil in all stages of decay. The major elements in organic matter are oxygen, hydrogen, and carbon.

Parts per billion (ppb) - A way to express the concentration of a chemical in a liquid, solid, or in air. Since one liter of water weighs one billion micrograms, one microgram of a chemical in one liter of water is equal to one ppb.

Permit - Permits are issued by Agricultural Commissioners for a specific site for the use of chemicals that have usually been designated as restricted pesticides. Restricted pesticides, for various reasons, are potentially more hazardous than other pesticides.

Pest control adviser (PCA) - A person, licensed by DPR and registered with the Agricultural Commissioner, who makes pest control recommendations. All agricultural use recommendations must be in writing and contain certain information. A PCA must complete continuing education requirements before his/her license may be renewed.

Pesticide Contamination Prevention Act (PCPA, AB 2021)-A law, effective January 1, 1986, which added agricultural use sections 13141 through 13152 to Division 7 of the FAC. The PCPA requires the following: (1) each registrant of an agricultural use pesticide to submit environmental fate data to DPR; (2) the director to use those data to establish a list of pesticides with the potential to pollute ground water (Ground Water Protection List); (3) the director to monitor ground water for these pesticides; (4) all local, county and state agencies to report to DPR the results of pesticides sampled in ground water; (5) the director to maintain a specified well sampling database and to post certain information annually on its website about pesticides in ground water and (6) a specified subcommittee and the director to conduct a formal review to determine if continued use of a pesticide can be allowed if it is detected and verified in ground water due to legal agricultural use.

Pesticide Detection Response Process (PDRP) – A process, established pursuant to sections 13149 through 13151 (FAC), in which the detection of a pesticide residue in ground water is investigated, evaluated, and, when necessary, mitigated. As part of the process, a determination must be made that the detection resulted from a legal agricultural use application of the pesticide. As a result of this process, the use of a pesticide in California may be modified or cancelled.

Pesticide Management Zone (PMZ) - A former geographic surveying unit of approximately one square mile, which is vulnerable to ground water contamination based on detections of a pesticide-related compound in ground water due to legal, agricultural use. PMZs were pesticide specific. The use of a pesticide inside its PMZs was subject to certain ground water protection restrictions and requirements. PMZs were renamed GWPAs in May 2004.

Physicochemical - The types of behavior that a substance exhibits in chemical reactions are called its chemical properties; other characteristics that are typical of a substance are called its physical properties. Taken together, the chemical and physical properties of a substance are called its physicochemical properties.

Point source - A source of contamination, such as a spill or at a waste site that is initially deposited and concentrated in a small, well-defined area. The contamination can be traced to its

point of origin by locating a specifically shaped pattern of residues in the ground water called a plume.

Range - A single series or row of townships, each six miles square, extending parallel to, and numbered east and west from, a survey base meridian line. (See well numbering system.)

Recommended PMZ - A section of land that had been identified as sensitive to ground water pollution by specific pesticides base on detections in ground water but not formally adopted into section 6802 (3CCR).

Registered pesticide - A pesticide product approved by the USEPA and DPR for use in California.

Regulations - These are adopted by state agencies to implement or clarify statutes enacted by the California Legislature. They can also be adopted in response to federal legislation, court decisions, changing technologies, and concerns for the health and well being of the residents of California.

Replicate sample - A discrete sample taken from a well at the same time as the initial detection sample; not a single sample split into multiple samples.

Restricted material - Compounds designated as "restricted materials" in section 6400 (3CCR) that, for various reasons, are potentially more hazardous to people, animals, or the environment than other pesticides. As a result, the use of these materials is regulated more closely and is permitted only when additional precautionary measures are taken where applicable. Certain reporting requirements and dealer responsibilities apply to the use of restricted materials.

Section - A land unit of 640 acres or one square mile, equal to l/36 of a township. (See well numbering system.)

Small public water system well - A well serving fewer than 200 connections.

Specific numerical values (SNV) - Certain numeric threshold values that the PCPA requires to be established for the following physical and chemical properties of pesticide active ingredients: water solubility, soil adsorption coefficient, hydrolysis, aerobic and anaerobic soil metabolism, and field dissipation (the field dissipation SNV has not yet been established). The PCPA associates these properties with the longevity and mobility of a chemical in the soil and requires the establishment of SNVs in regulation as a means of predicting which pesticides are likely to pollute ground water.

State Well Number - See “well numbering system.”

Survey - In this report, well monitoring conducted by an agency or private firm for a specified length of time in a designated area.

Township - A public land surveying unit, which is a square parcel of land, six miles on each side. The location of a township is established as being so many six-mile units east or west of a north-south line running through an initial point (called the "principal meridian") and so many six-mile units north or south of an east-west line running through another point (called the "baseline"). (See “well numbering system.”)

Triazines - A chemical compound derived from any of three isomeric compounds, each having three carbon and three nitrogen atoms in a six-member ring. Triazines are strong inhibitors of photosynthesis. Atrazine and simazine are triazines.

Verified detection - confirmed and unconfirmed detections are verified if they meet the criteria specified in (FAC section 13149[d]) which requires that either the analytical method provides unequivocal identification of a chemical and is approved by DPR or that the detection is verified within 30 days by a second analytical method or a second analytical laboratory approved by DPR. Criteria have been set by DPR (Biermann, 1989, 1996) for determining if the detection of a pesticide or its breakdown product(s) meets the standards of section 13149[d].

Water quality limits –(Marshack, Jon B., 2003).

Water solubility - The ability of a substance to go into solution with water.

Well inventory database- a statewide database, required by the PCPA, of wells sampled for pesticide active ingredients.

Well numbering system - The California well numbering system is based on a rectangular system commonly referred to as the Public Lands Survey. Under this system, all tracts of lands are tied to an initial point and identified as being in a township. A township is a square parcel of land six miles on each side. Its location is established as being so many six-mile units east or west of a north-south line running through the initial point (called the “principal meridian") and so many six-mile units north or south of an east-west line running through the point (called the "baseline”). The meridian lines parallel to, and east or west of, the principal meridian are called range lines. Every township is further divided into 36 parts called sections. A section is also described as a square parcel of land one mile on a side, each containing 640 acres. Each well in California is assigned a unique number (referred to as the State Well Number) by the Department of Water Resources (DWR). For well numbering purposes, each section of land is divided into

sixteen 40-acre tracts. Once the well location is established in the 40 acre tract, it is assigned a sequence number, which is assigned in chronological order by DWR personnel. The DWR maintains an index of state well numbers to prevent duplication.